NATIONAL CULTURE AND SAFETY:

A META-ANALYSIS OF THE RELATIONSHIPS BETWEEN HOFSTEDE'S

CULTURAL VALUE DIMENSIONS AND WORKPLACE SAFETY CONSTRUCTS

A Dissertation

by

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ABSTRACT

National culture, often conceptualized using Hofstede's five cultural value dimensions (individualism-collectivism, power distance, uncertainty avoidance, masculinity-femininity, and long- vs. short-term orientation), has been linked to numerous workplace perceptions and behavior. However, workplace safety researchers commonly ignore the influence of culture. The primary objectives of this study were to provide theoretical explanations for the relationships between Hofstede's cultural values and workplace safety constructs, and then meta-analytically examine these relationships and pertinent moderators.

Theories concerning national culture, cultural values, motivation, and attraction-selection-attrition, along with previous safety models were used as the basis to contend that Hofstede's cultural values at the psychological, organizational/group, and national level influence safety constructs (i.e., safety climate, leadership, social support, risk and hazards, safety motivation and knowledge, safety compliance and participation, and safety outcomes). Individualism and long-term orientation were hypothesized as positive correlates of safety perceptions and behavior, whereas power distance, uncertainty avoidance, and masculinity were expected to be negatively related to safety constructs.

Relationships between cultural values and safety, and proposed moderators (national-organizational cultural value difference and organizational cultural value variation) were examined using psychometric meta-analytic procedures of the findings

from 30 previous studies (416 effect sizes, N = 682,993). Uncertainty avoidance displayed the most consistent and strongest negative relationships with safety perceptions and behavior and positive relationship with safety outcomes. Long-term orientation and to some extent masculinity were also generally consistent with the expected relationships, as long-term orientation was positively related to safety constructs and masculinity was typically negatively related to safety. Findings for individualism and power distance were typically small and the largest effects were contrary to expectation.

The direct effect analyses largely reflected the existence of moderators and tests of the moderating conditions identified two primary considerations: (1) the relationships between cultural values and safety depended in part on the broader national cultural context and organizational culture and (2) the size of the correlations tended to be opposite of expectations in non-West organizations and for industries that have received less research attention. These results offer a number of impactful theoretical and practical implications for workplace safety research.

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TABLE OF CONTENTS

Page

LIST OF FIGURES

Page

LIST OF TABLES

1. INTRODUCTION

Workplace safety remains a concern of organizations and their employees despite continued efforts by researchers and practitioners to curtail accidents. Unfortunately, worker injuries continue to plague organizations in the U.S. and throughout the world. For instance, in the U.S. alone, 4,836 workers were killed on the job in 2015 and, in the same year approximately 2.9 employees sustained nonfatal injuries and illnesses (U.S. Bureau of Labor Statistics, 2017). In 2015, 188 workers suffered fatal injuries in Australia (Safe Work Australia, 2017) and in the U.K., 144 workers were killed and an estimated 72,702 others sustained a non-fatal injury (Health and Safety Executive, 2017).

A number of safety-related antecedents, behavior, and outcomes have been identified and studied in the multidisciplinary field of workplace safety (for meta-analytic integrative reviews see Christian, Bradley, Wallace, & Burke, 2011; Nahrgang, Morgeson, & Hofmann, 2011). Surprisingly, national culture (hereafter referred to as culture), defined by Hofstede (2001) as "the collective programing of the mind that distinguishes the members of one group or category of people from another" (p. 9), has not been theoretically integrated into models of workplace safety. In fact, culture is not even acknowledged in some of the most recent workplace safety models (e.g., Beus, McCord, & Zohar, 2016; Christian et al., 2011; Nahrgang et al., 2011). Similarly, meta-analyses of other safety-related variables lack an acknowledgement of the cultural context (e.g., Beus, Dhanani, & McCord, 2015; Beus, Payne, Bergman, & Arthur, 2010; Clark, 2006), which is partly a function of limited prior research.

The need for an understanding and integration of culture into workplace safety research is apparent considering cultural differences have been linked to numerous work-related attitudes and behavior (Taras, Kirkman, & Steel, 2010). Further, conceptual work and empirical evidence suggests that individuals from different nationalities differ in their expectations regarding safety management practices, involvement, and communication (Mearns & Yule, 2009).

There are a number of relevant examples that highlight the impact of culture on safety behavior and communication. For example, deference to authority inherent in high power distance cultures was a notable contributing factor in some flight accidents (Hodgson, Siemieniuch, & Hubbard, 2013). In these cases, captains were unwilling to admit their mistakes or lack of knowledge, while crew members adhered to the captain's instructions irrespective of standard procedures. In 1994, a China Airlines crash killed 264 of the 271 aboard when a takeoff/go-around lever was erroneously triggered. The captain along with the copilot continued the landing procedure despite not knowing and refusing to admit that neither crew member knew how to disengage the lever (Jing, Lu, & Peng, 2001). A Korean Air crash in 1997 provides another example of how high power distance culture resulted in a safety-related incident. In the audio recordings from the flight data recorder, crew members only hinted to the captain of the impending crash caused by his errors in judgment (Hodgson et al., 2013).

These examples highlight the need for a better understanding of the influence of national culture on safety behavior especially in multinational organizations that employ individuals with different cultural backgrounds (Mearns & Yule, 2009). U.S.

multinational companies employ over 34 million workers domestically and abroad, with estimates indicating that they are increasingly hiring abroad (U.S. Department of Commerce, 2016). Consequently, cultural differences that influence workplace safety are a practical consideration for many organizations. A deeper understanding of the role that culture plays in workplace safety is likely to help organizations select, train, and manage a workforce with the least amount of injuries possible.

In Hofstede's (1980, 1991) foundational work on national culture, he utilized data from a multinational organization (IBM) to distinguish between five cultural values: individualism-collectivism, power distance, uncertainty avoidance, masculinity-femininity, and long-term orientation. Hofstede's (1980, 1991) framework is the most commonly utilized conceptualization of culture in the organizational sciences (Taras, Rowney, & Steel, 2009). Similar to the broader organizational literature, prior studies of culture in the safety literature utilize Hofstede's (1980, 1991) dimensions almost exclusively. However, results concerning the relationships between Hofstede's (1980, 1991) cultural values and workplace safety constructs are inconsistent (e.g., Håvold, 2007; Lu, Lai, Lun, & Cheng, 2012; Mohamed, Ali, & Tam, 2009).

Further, there are some noteworthy issues with previous cross-cultural safety studies. Many studies provide little to no theoretical explanation for the relationships between Hofstede's dimensions and safety constructs (e.g., Mohamed et al., 2009), and those studies that do provide some explanation are inconsistent in their rationale as there are a number of contradictory predictions for the influence of each cultural dimension on safety behavior and outcomes. Additionally, most studies lack a common theoretical

framework of workplace safety to guide their assessment. Some studies also use or develop measures that have not been appropriately validated to assess safety constructs (e.g., Lu, Hsu, & Lee, 2016).

These considerations highlight the need for theoretically-based predictions concerning the relationships between cultural values and workplace safety constructs and more definitive conclusions about these relationships. To that end, the current study has two objectives: (1) the development and articulation based on theoretical rationale of hypotheses concerning the relationships between Hofstede's (1980, 1991) cultural values and safety constructs (e.g., safety climate, behavior, and outcomes), and (2) a meta-analysis of the relationships between cultural values and safety constructs and proposed moderators of these relationships.

In the next sections, culture and its various dimensions are described followed by a review of meta-analytically examined workplace safety models, theoretical connections between cultural values and safety, and a review of the cross-cultural safety literature. Hypothesized relationships between Hofstede's cultural values at the psychological, group/organizational, and national levels and safety constructs and moderators of these relationships are then provided.

Culture

There are numerous definitions of culture, however, many are founded on Kroeber and Kluckhohn's (1952) now famous description:

> Culture consists of patterns, explicit and implicit, of and for behavior acquired and transmitted by symbols, constituting the distinctive achievements of human

> groups, including their embodiments in artifacts; the essential core of culture consists of traditional (i.e., historically derived and selected) ideas and especially their attached values; culture systems may, on the one hand, be considered as products of action, on the other, as conditional elements of future action. (p. 357)

It would be inaccurate to suggest that Kroeber and Kluckhohn's (1952) definition is unanimously accepted; however, their description of culture as consisting of *patterns* is commonly cited and generally in line with most definitions of culture (see also Herskovits, 1948; House, Hanges, Javidan, Dorfman, & Gupta, 2004). According to Kroeber and Kluckhohn (1952), culture is not inherently connected with group membership, but rather consists of explicit and implicit engagement with patterns, which are products of action and also influence future behavior (Adams & Markus, 2001). These patterns come from and are transmitted primarily through values, as well as symbols, artifacts, and ideas.

As a part of their qualitative review of cross-culture measures, Taras et al. (2009) identified four characteristics of culture that are consistent across definitions. Researchers generally agree that culture is (1) a multilevel construct (i.e., national, group/organizational, individual); (2) conceptualized using a layered or "onion" framework in which assumptions and values serve as the core aspects of culture with practices, symbols, and artifacts as outer layers (e.g., Hofstede 1980; Trompenaars, 1993); (3) shared among individuals; and (4) relatively stable over time.

The study of culture is relevant to a number of disciplines and varies by level of analysis (national, organizational, individual/psychological) and the specific

characteristics of interest (e.g., values, traditions, rituals). Cross-cultural and cultural psychology are two such disciplines in which researchers seek to connect culture and psychology, contending that "human behavior is meaningful only when viewed in the sociocultural context in which it occurs" (Segall, 1979, p. 3). However, cross-cultural and cultural psychologists differ in their understanding and application of culture. Cross-cultural psychology is synonymous with a variable or dimensions approach, which often involves assessing culture through self-reports of values (Kluckhohn & Strodtbeck, 1961). Cross-cultural research follows an etic understanding of culture; that is, researchers focus on identifying a set of cultural dimensions that are assumed to be universally applicable (Taras et al., 2009). Cultural psychology is a newer discipline, which differs from cross-cultural psychology in its reliance on less variable-centric approaches and views culture through an emic, rather than etic lens (Shweder & Sullivan, 1993). Cultural psychology researchers follow an emic understanding of culture, contending that psychological principles should be culturally-based and not applied uniformly (i.e., some aspects of cultures are unique). Moreover, they argue that the cross-cultural approach of reification (i.e., turning names into things) "takes something that was dynamic and flowing and renders it – at least for a moment – static and fixed" (Adams & Markus, 2001, p. 285).

A cross-cultural psychological perspective will be taken in this study despite the aforementioned limitations because the cultural dimensions approach offers useful information about differences between individuals within and across cultures based on a number of dimensions that are easily understood and examined. Fittingly, the cross-

cultural approach is the best known and utilized way of examining culture in the organizational sciences (Taras et al., 2009; Taras et al., 2010). Most theoretical understanding and empirical evidence relates to cultural dimensions. This study will use a cultural dimensions approach given these considerations, while acknowledging that culture is a much broader construct encompassing myriad aspects, including values, laws, corporate governance, national ratings of health, trade unions, etc., some of which are culture-specific and cannot and should not be applied uniformly.

Cultural Values

Values refer to "an enduring belief that a specific mode of conduct or end-state of existence is personally and socially preferable to alternative modes of conduct or end states of existence" (Rokeach, 1973, pp. 159-160). Hofstede (2001) presented a similar definition of values: "A broad tendency to prefer certain states of affairs over others" (p. 5). Kroeber and Kluckhohn (1952) described values as "the essential core of culture" and subsequent cultural frameworks likewise incorporated values as core components (Hofstede, 1980, 2001; Triandis, 1995). Hofstede's (1980, 2001) and Triandis's (1995) conceptualizations of culture are commonly referred to as the value/belief theory of culture (House et al., 2004). They contend that individual behavior is influenced by the values and beliefs held among members of a culture and the acceptability of certain behavior. Similarly, social adaptation theory (Kahle, 1983; Kahle, Kulka, & Klingel, 1980) contends that values are fundamental to individuals' adaptation and subsequently govern attitudes and behavior.

In his classic book, Hofstede (1980) developed a cultural value framework based on a survey of 88,000 employees, across 72 countries from IBM. Results of country-level factor analyses supported a four-factor structure. Those four factors are now referred to as individualism-collectivism, power distance, uncertainty avoidance, and masculinity-femininity. In a follow up study, Hofstede (1991) identified a fifth factor: Confucian dynamism, also referred to as long- vs. short-term orientation. Hofstede's (1980, 1991) cultural value framework has since become the most heavily researched and utilized cultural framework in psychology (Taras et al., 2009).

Despite its popularity, Hofstede's (1980, 1991) dimensions are not uniformly accepted. Indeed, there is some research to suggest that Hofstede's cultural value measures are not psychometrically sound (Spector et al., 2001). Concerns with Hofstede's (1980, 1991) values survey led to further research as a means of identifying additional cultural values and developing measures that result in more reliable scores. There are a few notable efforts utilizing large, cross-national samples that warrant mentioning, including Trompenaars (1993), Schwartz (1992), and House et al. (2004) (see Table 1 for an overview and comparison). Trompenaars and colleagues (Smith, Dugan, & Trompenaars, 1996; Trompenaars, 1993) developed and administered a cultural value survey to over 8,500 employees, identifying seven cultural value dimensions: universalism vs. particularism, individualism vs. collectivism, neutral vs. emotional, specific vs. diffuse, achievement vs. ascription, orientation in time, and attitudes towards the environment. Schwartz (1992) and Schwartz and Boehnke (2004) administered their cultural value survey to a sample of teachers, identifying nine cultural

Table 1

Common Cultural Value Frameworks – Connections to Hofstede (1980, 1991)

Hofstede (1980, 1991)	**House et al. (2004)**	**Schwartz (1992)**	**Trompenaars (1993)**
Individualism-collectivism	Collectivism I Collectivism II	Conformity	Individualism vs. collectivism
Power distance	Power distance		
Uncertainty avoidance	Uncertainty avoidance		
Masculinity-femininity	Gender egalitarianism Assertiveness	Power achievement	Achievement vs. ascription
Long-term orientation	Future orientation	Tradition	Orientation in time
	Humane orientation Performance orientation	Benevolence Hedonism Security Self-direction Stimulation Universalism	Attitudes towards the environment Neutral vs. emotional Specific vs. diffuse Universalism vs. particularism

Note. Cultural values across rows listed in order of similarity to Hofstede's (1980, 1991) cultural values (Hofstede et al., 2010; Taras et al., 2009).

values: universalism, benevolence, tradition, conformity, security, power achievement, hedonism, stimulation, and self-direction.

The Global Leadership and Organizational Effectiveness (GLOBE) project (House et al., 2004) is the most comprehensive cultural value measurement effort to date, consisting of collaborations among 170 social scientists and management scholars from 61 countries. The overall goal of project GLOBE was to theoretically connect and empirically examine the impact of cultural variables on leadership (House et al., 2004). A core component of their project was the identification and description of nine cultural values: uncertainty avoidance, power distance, collectivism I (societal emphasis on collectivism), collectivism II (family collectivistic practices), gender egalitarianism, assertiveness, future orientation, performance orientation, and humane orientation. They developed scales associated with each cultural value and assessed the psychometric properties of these scales using a cross-national sample of over 17,000 employees.

This study focuses solely on Hofstede's (1980, 1991) cultural value framework despite these more recent efforts because (1) most subsequent work encompasses Hofstede's (1980, 1991) original cultural values, (2) the marginal utility of recent cultural value frameworks is questionable, and (3) Hofstede's (1980, 1991) cultural value framework continues to be the most parsimonious, well-known, and researched conceptualization in the organizational sciences. In their literature review, Taras et al. (2009) compared popular cultural value frameworks and their associated measures, including Hofstede (1980, 1991), Trompenaars (1993), Schwartz (1992), and House et al. (2004). They acknowledge that no single cultural value framework or the

combination of all cultural value frameworks is representative of culture in its entirety. However, Taras et al.'s (2009) qualitative review coupled with other reviews of the cross-cultural literature suggest that Hofstede's dimensions are foundational to most subsequent frameworks and associated measures (see also Taras et al., 2010; Taras & Steel, 2009). For instance, seven of the nine cultural values studied in project GLOBE are variations of Hofstede's (1980, 1991) original values. Moreover, Taras et al. (2009) acknowledge that "while the wide array of measures can presumably provide a richer description of the studied phenomenon, the marginal utility of additional measures is probably diminishing" (p. 362). This study will henceforth focus exclusively on Hofstede's (1980, 1991) cultural values.

There is also analogous research aimed at reconceptualizing Hofstede's original values. Some research suggests that individualism and collectivism are two distinct constructs, such that societies and individuals can be simultaneously high or low on individualism and collectivism (e.g., Markus & Kitayama, 1991). Individualism-collectivism has been further split along horizontal and vertical subdimensions (Triandis, Chan, Bhawuk, Iwao, & Sinha, 1995). Other researchers have similarly reframed Hofstede's masculinity-femininity dimension into two separate constructs: gender egalitarianism and assertiveness (Aumann & Ostroff, 2006; House et al., 2004). However, most prior cross-cultural research and especially in the extant safety literature do not make these distinctions (Tsui, Nifadkar, & Ou, 2007). As such, this study uses Hofstede's (1980, 1991) original conceptualization of his cultural values, while

acknowledging that some more recent distinctions are meaningful, but beyond the scope of this particular study.

Level of analysis. Hofstede's (1980, 1991) dimensions have been measured and applied to phenomena at the individual, group/organizational, national, and cross levels (Tsui et al., 2007). Individual-level analyses involve measuring Hofstede's dimensions individually and relating the responses to measures of individual-level outcomes (e.g., perceptions, attitudes, and behavior). National- and group/organization-level analyses involve aggregating individual-level responses to measures of Hofstede's dimensions based on national or group/organizational status and relating the aggregated results to national or group/organizational outcomes (e.g., gross domestic product, organization/firm performance). National level analyses often involve using the national level scores from Hofstede (1980, 1991) and linking those previously published cultural value scores to national level outcomes. Cultural values measured at the individual level will hereafter be referred to as *psychological* cultural values (cf. Jackson, Colquitt, Wesson, & Zapata-Phelan, 2006) to differentiate between individual-level and organizational/group-level and national-level analyses of Hofstede's dimensions. Cross-level analyses involve assigning national scores for Hofstede's dimensions to individuals and associating those scores with individual-level outcomes.

Hofstede (1980, 1991) conceptualized and intended his cultural values to be analyzed only at the country level of analysis, which led some researchers (including Hofstede) to raise concerns with applying Hofstede's dimensions at lower levels as committing an ecological fallacy by assuming that higher-level constructs generalize to

lower levels (Taras et al., 2010). Years of subsequent work suggest that Hofstede's values can be appropriately applied to multiple levels of analysis; there is both within- and across-country variation in cultural values (Kirkman, Lowe, & Gibson, 2006). In fact, some researchers claim that cultural research aimed at making predictions about individual behavior requires a multilevel application of societal-level factors and individual-level variables (Oyserman & Uskul, 2008). From a theoretical standpoint, multilevel or cross-level models are not inherently flawed (Klein, Dansereau, & Hall, 1994; Schwartz, 1994).

Moreover, whereas Hofstede conceptualized his cultural values at the national level, he relied on self-report measures, which consisted of items assessing individual experiences. Hofstede's values continue to be measured almost exclusively at the psychological level (Taras et al., 2009). In a recent meta-analysis, Taras et al. (2010) found that Hofstede's (1980, 1991) cultural values were related to a number of organizationally relevant attitudes and behavior at multiple levels (i.e., national, group, psychological), and concluded, "our findings, coupled with previous critiques that Hofstede's VSM [Values Survey Module] is not a purely nation-level measure, may mean that the VSM is actually more valid at the individual level, rather than the national level" (p. 433).

Multilevel models of culture and cultural values. Despite the popularity of Hofstede's cultural dimensions and applicability at multiple levels of analysis, there have been few attempts to develop multilevel models of culture that incorporate cultural values and how they influence individual-level outcomes. The models by Erez and Gati

(2004) and Oyserman and colleagues (Oyserman, Kemmelmeier, & Coon, 2002b; Oyserman & Uskul, 2008) are two important exceptions that will be used in this study to provide guidance concerning how national-, organizational/group-, and psychological-level cultural values combine to influence workplace safety.

Erez and Gati's (2004) representation of culture consists of both structural and dynamic components (Figure 1). The structural component of their model accounts for the underlying nested nature of culture; individuals are inherently nested within the group, organizational, and national context. The dynamic aspect of their model refers to the top down and bottom up process by which each level affects changes in the others. Moreover, their model suggests that there are similarities in the meaning of culture across levels of analysis. Indeed, previous research indicates that there are commonalities in cultural values at the psychological, organizational, and national level (Hofstede, Neuijen, Ohavy, & Sanders, 1990; House et al., 2004; Schwartz, 1994).

Oyserman et al. (2002b) and Oyserman and Uskul (2008) also developed a multilevel model of culture, the focus of which was societal- and individual-level cultural factors and their influence on individual-level outcomes (Figure 2). According to their model, individual-level consequences including self-concept, cognition, affect, and behavior are influenced by a variety of cultural processes. A complete review of Oyserman and colleagues' (Oyserman et al., 2002b; Oyserman & Uskul, 2008) model is beyond the scope of this study; however, of particular importance is the influence of distal culture (e.g., national Hofstede values) and individually internalized culture (e.g., individual Hofstede values) on individual consequences. Oyserman and Uskul (2008)

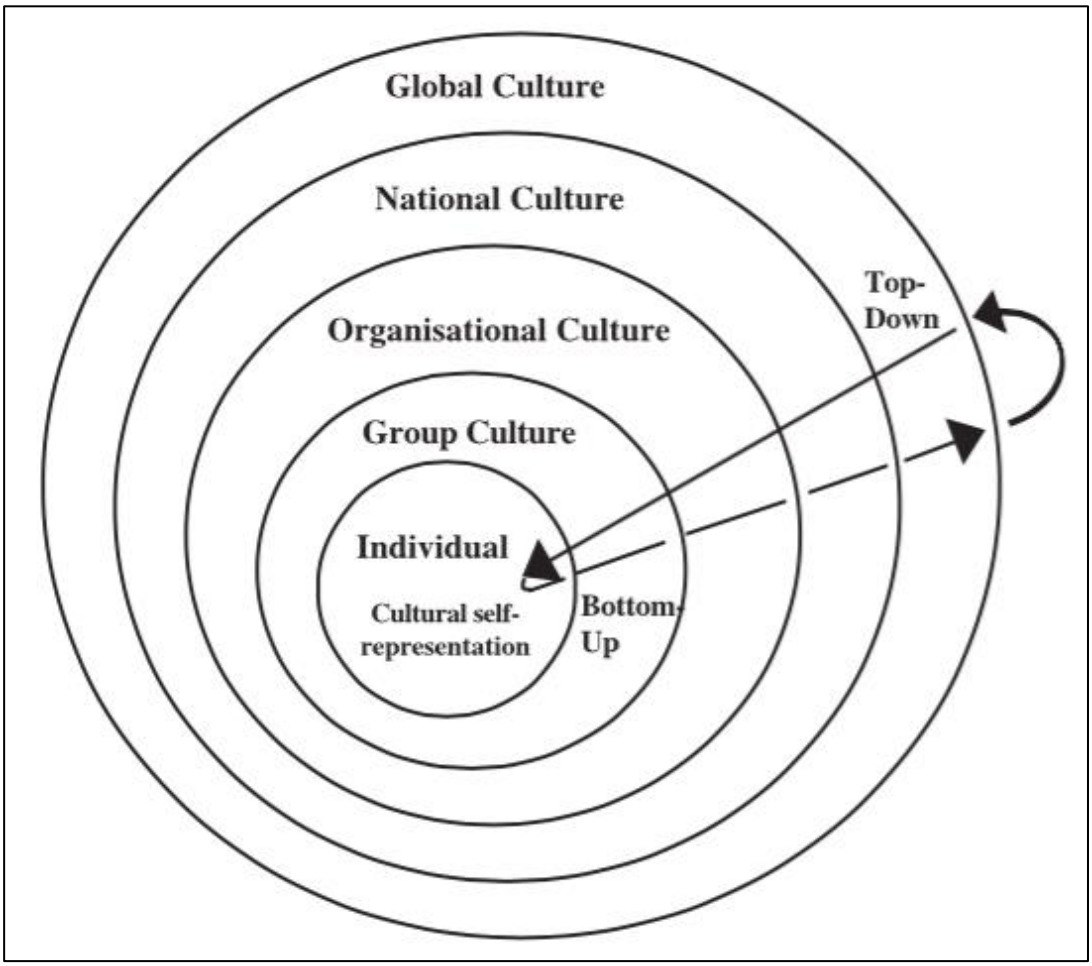

Figure 1. The dynamic of top-down-bottom-up processes across levels of culture (Erez & Gati, 2004, p. 588).

refer to the relationship between distal culture and individual consequences as the direct distal path or "applying Hofstede." The cross-level analysis previously described is a common example of the direct distal path. Oyserman and Uskul (2008) note several disadvantages to this approach based on the inherent assumptions that (1) individuals within a particular country are homogeneous on Hofstede's dimensions, (2) members of a culture can express their values and current measures can appropriately capture this

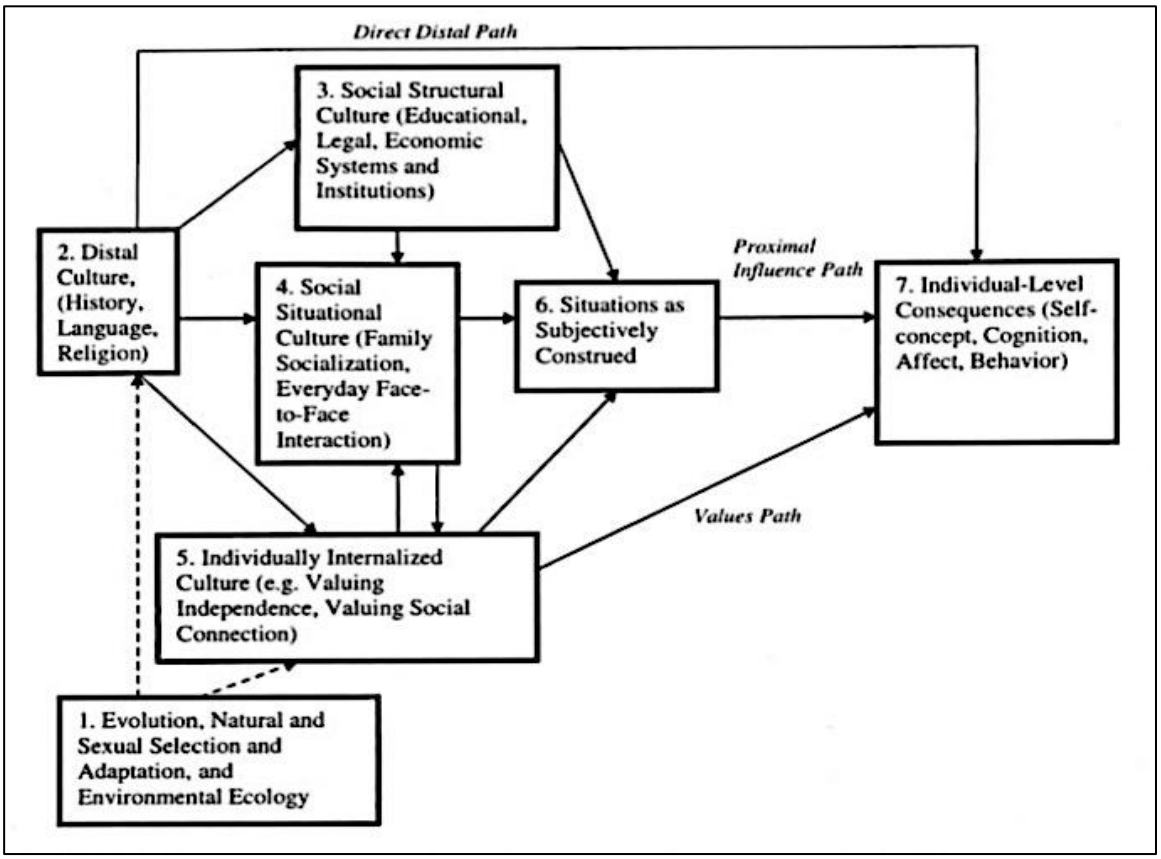

Figure 2. Culture as a multilevel process influencing individual-level outcomes (Oyserman & Uskul, 2008, p. 149).

information, (3) shared values are essential to culture, (4) values are generalizable across contexts, and (5) values remain stable over time. Despite these limitations, Oyserman and Uskul (2008) acknowledge that cross-level examinations have provided useful cross-cultural insights, including insights based on their own meta-analysis of individualism-collectivism and workplace attitudes and behavior (i.e., Oyserman, Coon, & Kemmelmeier, 2002a).

Oyserman and Uskul (2008) also propose that distal culture and individually internalized culture are directly related, which in turn influence individual consequences.

The values path refers to the relationship between individually internalized culture and individual consequences (e.g., psychological-level cultural value analyses). Oyserman and Uskul (2008) noted limitations of this approach as well, including the assumptions that measures of Hofstede's dimensions are cross-nationally equivalent and that individuals are knowledgeable about cultural values and readily able to provide an accurate response. However, they also acknowledge that the study of individual differences on cultural values provides meaningful insights concerning the cultural influences of individual behavior, but highlight that a psychological-level analysis should not be considered analogous to measuring culture.

Cultural values and organizational behavior. The results of meta-analytic examinations of Hofstede's (1980, 1991) dimensions and organizational attitudes and behavior provide further guidance for making predictions about the relationships between Hofstede's values and safety-specific constructs and behavior. In two recent studies, researchers examined the relationships between Hofstede's (1980, 1991) dimensions and organizationally relevant attitudes, emotions, traits, behavior, and performance (Oyserman et al., 2002a; Taras et al., 2010). Oyserman et al. (2002a) only analyzed studies concerning individualism-collectivism, whereas Taras et al.'s (2010) meta-analysis is the most recent and encompassing review to date, focusing on Hofstede's (1980) four original values. Taras et al. (2010) had a number of notable findings relevant to the current investigation. First, they relied on social adaptation theory and the value-attitude-behavior hierarchy (Homer & Kahle, 1988) as an explanation for the effect of cultural values on work-related emotions, attitudes and

perceptions, and behavior, which suggests that cultural values are proximal predictors of attitudes and perceptions and distally related to behavior and performance. Taras et al. (2010) found support for their contention that cultural values are more strongly associated with emotions ($\rho = .27$) and attitudes and perceptions ($\rho = .20$), than behaviors ($\rho = .15$) and job performance ($\rho = .03$).

Second, effect sizes of cultural values varied substantially depending on the correlate of interest; that is, relationships among Hofstede's values and relevant organizational constructs varied across psychological, organizational, and national levels (Taras et al., 2010). Effect sizes for all outcomes were largest at the national level ($\rho = .35$), followed by the group level ($\rho = .21$), and smallest at the psychological level ($\rho = .18$). Taras et al. (2010) attributed this finding to a reduction in measurement error at the aggregate (i.e., national, group) level because aggregated data tend to be more stable especially when coupled with large samples (Steel & Ones, 2002). Third, effect sizes varied due to a number of moderators. They found that cultural value effect sizes were stronger for older vs. younger respondents, managers and employees vs. students, men vs. women, those with more vs. fewer years of education, primary vs. secondary data, and culturally tighter vs. looser countries (i.e., the clarity and pervasiveness of norms in society and the degree of tolerance for deviation from social norms [Gelfand, Nishii, & Raver, 2006]).

Workplace Safety

This study examines the relationship between cultural values and safety, integrating Hofstede's dimensions into a framework of workplace safety based on two

previously developed safety models and their associated safety-relevant constructs (Christian et al., 2009; Nahrgang et al., 2011). Nahrgang et al. (2011) relied on aspects of the job demand and resources model (Bakker & Demerouti, 2007) to develop their safety framework, defining job demands in the context of safety as consisting of risks and hazards, physical demands, and job complexity, and job resources consisting of knowledge, autonomy, and supportive environment (i.e., social support, leadership, safety climate). They postulated that the relationship between job resources and safety outcomes is mediated by engagement (i.e., participation, compliance, and satisfaction), whereas the relationship between job demands and safety outcomes is mediated by burnout.

Christian et al. (2009) relied on more traditional models of safety (e.g., Griffin & Neal, 2000), which were founded on motivational processes and job performance. In Christian et al.'s (2009) framework, safety behavior and in turn outcomes (i.e., accidents and injuries) result from proximal and distal factors. They divided antecedents of safety behavior into three primary categories: (1) distal situation-related factors (i.e., safety climate and leadership behaviors), (2) distal person-related factors (i.e., personality and safety attitudes), and (3) proximal person-related factors (i.e., safety motivation and safety knowledge). Distal factors and safety outcomes are indirectly related via safety motivation, knowledge, and performance (i.e., compliance and participation). Further, the relationship between safety motivation and knowledge and outcomes is mediated by safety performance, with safety performance directly related to outcomes.

Three general observations and conclusions can be made concerning these two models. First, safety outcomes (e.g., injuries, incidents) occur as a result of an amalgamation of safety-specific individual factors/states (i.e., safety motivation, knowledge, and behavior/performance [compliance and participation]) and safety-specific situational factors (i.e., leadership, social support, safety climate, and risks and hazards), as well as more general individual factors (i.e., personality, job attitudes, engagement, burnout) and work/job characteristics (i.e., physical demands, complexity, and autonomy; Table 2 presents a summary of meta-analytically [Christian et al., 2009; Nahrgang et al., 2011] examined workplace safety constructs). Second, both models suggest that safety performance and outcomes are directly related, whereas other situational and individual factors are indirectly related to outcomes. Third, neither model acknowledges cultural influences, which is in part a function of limited studies examining cultural differences.

Safety-specific constructs defined. Researchers generally agree that safety behavior consists of compliance and participation, which is likened to the distinction between task and contextual performance in the broader organizational literature (Griffin & Neal, 2000). Safety compliance refers to behaviors in line with stated organizational safety policies and procedures (Jex, Swanson, & Grubb, 2013). Safety participation, however, goes beyond the formal requirements and involves intentional efforts to improve safety (Jex et al., 2013). Additionally, Griffin and Neal (2000) argued that individual knowledge, skill, and motivation are core aspects of safety behavior. Safety knowledge and skill include knowledge and experience concerning safe practices,

Table 2

Meta-Analytically Examined Workplace Safety Constructs

Type	Construct	Relationship with safety outcomes (injuries, incidents)
Safety-Specific Individual Factors	1. Safety motivation[a]	–
	2. Safety knowledge[a, b]	–
	3. Safety compliance[a, b]	–
	4. Safety participation[a, b]	–
Safety-Specific Situational Factors	1. Leadership[a, b]	–
	2. Social support[b]	–
	3. Safety climate[a, b]	–
	4. Risk and hazards[b]	+
Job-Specific Individual Factors	1. Personality[a, b]	+/–
	2. Job satisfaction[a, b]	–
	3. Commitment[a]	–
	4. Engagement[b]	–
	5. Burnout[b]	+
General Work Characteristics	1. Physical demands[b]	+
	2. Job complexity[b]	+
	3. Job autonomy[b]	–

Note. [a]Included in Christian et al. (2009); [b]Included in Nahrgang et al. (2011)

procedures, and the appropriate use of equipment (Neal & Griffin, 2002). Safety motivation refers to "an individual's willingness to exert effort to enact safety behaviors and the valence associated with those behaviors" (Neal & Griffin, 2006, p. 947).

Additional safety-related constructs include leadership, social support, safety climate, and job risk and hazards. Leadership refers to a social influence process that occurs at various levels (e.g., individual, dynamic, group, or strategic; Avolio, Sosik, &

Berson, 2013), and is not a safety-specific construct. However, with regard to workplace safety, leadership involves support based on communicating the value of safety, helping employees develop new safety practices, and having a general concern for safety (Nahrgang et al., 2011; Zohar, 2002). In accordance with Christian et al. (2009) and Nahrgang et al. (2011), only safety-specific aspects of leadership are incorporated in the current study. Likewise, social support is not a safety-specific construct, but this study will examine the safety-specific aspects of social support, defined by coworker support and advice regarding safety (Morgeson & Humphrey, 2006).

Safety climate was first defined by Zohar (1980) and is now one of the most extensively studied safety variables. Safety climate refers to shared employee perceptions of policies, practices, and procedures regarding safety (Zohar, 1980, 2003). Safety climate is a group-level construct that is measured based on individual perceptions (i.e., psychological safety climate) of management commitment to safety, safety communication, co-worker safety practices, safety training, safety involvement, safety rewards, and safety equipment and housekeeping (Beus, Muñoz, Arthur, & Payne, 2013). A final antecedent of safety outcomes is job risk and hazards, which are often measured based on individual perceptions, including the degree to which employees feel that they are exposed to hazards and physical harm and the degree to which they feel that their job is physically dangerous (Jermier, Gaines, & McIntosh, 1989; Nahrgang et al., 2011).

Job-specific constructs defined. Job-specific constructs relevant to workplace safety are categorized as individual factors (i.e., personality, job attitudes, engagement,

burnout) and general work characteristics (i.e., physical demands, job complexity, autonomy). Personality is arguably best represented by the Five-Factor Model (FFM), which differentiates between conscientiousness (orderly, responsible, dependable), agreeableness (good-natured, cooperative, trustful), extraversion (talkative, assertive, energetic), openness to experience (intellectual, imaginative, independent-minded), and emotional stability (calm, not neurotic, not easily upset) (John & Srivastava, 1999).

Job attitudes (e.g., job satisfaction, organizational commitment) refer to cognitive and affective evaluations of the job and presumably lead to motivation to behave safely (Christian et al., 2009; Griffin & Neal, 2000). Traditional approaches to job satisfaction focus on cognitive responses to the job situation, arguing that employees are satisfied when their work environment (e.g., pay, benefits, status, working conditions) meets a set of individual standards or inputs (e.g., time, effort) (Dalal, 2012). Meyer and Allen (1991) defined commitment in three mindsets: "affective attachment to the organization [affective], perceived costs associated with leaving the organization [continuance], and obligation to remain with the organization [normative]" (pp. 63-64).

Additional individual factors are engagement and burnout. Engagement refers to "a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption" (Schaufeli, Salanova, González-Romá, & Bakker, 2002, p. 74). Nahrgang et al. (2011) conceptualized engagement in the safety context as a combination of safety participation (i.e., involvement, participation, and communication), compliance (i.e., conform to safety expectations, rules, and procedures), and satisfaction. In the safety environment, Nahrgang et al. (2011) defined

burnout based on negative employee well-being (e.g., worker anxiety, health, and depression) and work stress.

Nahrgang et al. (2011) proposed additional aspects of working conditions (i.e., physical demands, job complexity, and autonomy) as predictors of safety outcomes; however, these general working conditions are not incorporated in the cross-cultural safety model as directly related to safety constructs. Rather, job characteristics are incorporated in the cross-cultural safety model as moderators of the relationships between cultural values and safety constructs, which will be described in detail later.

Cross-Cultural Safety Literature Review

The relationships between cultural values and safety constructs are a primary consideration in this study. As such, a literature search was conducted to identify previous cross-cultural safety studies that examined the relationship between at least one of Hofstede's (1980, 1991) five cultural value dimensions and a workplace safety construct previously described (i.e., risk and hazards, social support for safety, leadership about safety, safety climate, safety motivation, safety knowledge, compliance, participation, or outcomes).

Individualism. Most of the identified articles assessed the relationships between individualism and safety constructs. Generally, findings at the psychological level are mixed, whereas results at the national level are more consistent. At the psychological level, some research suggests that individualism is negatively associated with safety climate (Okilie & Okoye, 2012), safety knowledge (Håvold, 2007), and safety behavior (Håvold, 2007; Hetherington, 2007; Khan, 2007; Lu et al., 2012), and positively

associated with safety outcomes (i.e., fatal work injuries; Keser, Gökmen, & Türen, 2015). However, other researchers found that individualism was associated with lower perception of risk (Habibnezhad & Esmaeili, 2016) and more safety behavior (Shen, 2013), as well as fewer negative outcomes (Anicich et al., 2015). Håvold (2007) and Reader et al. (2015) analyzed psychological-level relationships, but assigned individualism rates based on participants' nationality, rather than relying on self-report measures (i.e., cross level of analysis). Håvold (2005) found that national-level individualism was positively associated with safety knowledge, and Reader et al. (2015) found that individualism and safety climate were positively related.

National-level examinations of the relationship between individualism and safety constructs are less common and primarily involve an examination of the relationship between individualism and national fatality or accident rates. Previous analyses at the national level consistently found that individualism was negatively associated with safety outcomes, including fatality and accident rates and man-made disasters (Infortunio, 2002; Minkov, 2016; Özkan & Lajunen, 2007; Park, 2011; Ramsden, 1985; Reniers & Gridon, 2013; Soeters & Boer, 2000; Weener & Russell, 1994).

Power distance. Most examinations of the relationship between power distance and safety constructs are at the psychological level. Some researchers found that power distance was positively associated with safety climate (Okilie & Okoye, 2012), safety knowledge (Håvold, 2007), and safety behavior (Alshahrani, Panuwatwanich, & Mohamed, 2015; Håvold, 2007). However, other researchers found that those higher on power distance reported lower safety climate (Khan, 2007) and safety behavior

(Alshahrani et al., 2015; Hetherington, 2007; Khan, 2007; Lu et al., 2012; Tharaldsen, Mearns, & Knudsen, 2010). Results from those studies that utilized national-level statistics, but analyzed relationships at the psychological level (i.e., Håvold, 2005; Reader et al., 2015), similarly indicated that power distance was negatively related to safety knowledge and safety climate. In comparison, previous studies at the national level found a positive relationship between power distance and safety outcomes, including occupational accident rates (Ramsden, 1985; Soeters & Boer, 2000; Weener & Russell, 1994) and fatal work injuries (Infortunio, 2002; Keser et al., 2015; Özkan & Lajunen, 2007; Reniers & Gridon, 2013).

Uncertainty avoidance. Likewise, there are competing results for the relationships between uncertainty avoidance and safety climate, knowledge, behavior, and outcomes at the psychological level. Some studies found that uncertainty avoidance was a positive correlate of safety climate (Burke et al., 2008; Okilie & Okoye, 2012), knowledge (Kortmann, 2015), and behavior (Alshahrani et al., 2015; Burke et al., 2008; Khan, 2007), and negatively related to safety outcomes (Burke et al., 2008; Lu et al., 2012). Findings from other researchers indicated that uncertainty avoidance was a detriment to safety, including safety climate (Khan, 2015; Noort et al., 2015), knowledge (Håvold, 2007), behavior (Håvold, 2007; Hetherington, 2007), and outcomes (Anicich et al., 2015). Reader et al.'s (2015) analysis suggested that uncertainty avoidance based on national-level Hofstede scores was negatively related to safety climate. National-level examinations consistently indicated that uncertainty avoidance was positively related to safety outcomes such as occupational accidents (Soeters & Boer, 2000), fatal work

injuries (Infortunio, 2002; Keser et al., 2015; Özkan & Lajunen, 2007; Reniers & Gridon, 2013), and man-made disasters (Park, 2011).

Masculinity. A majority of the identified studies that examined the relationship between masculinity and safety did so at the psychological level. Previous results indicate that masculinity is associated with less favorable perceptions of safety climate and greater risk (Habibnezhad & Esmaeili, 2016; Khan, 2007; Okilie & Okoye, 2012; Reader et al, 2015). Likewise, Alshahrani et al. (2015), Hetherington (2007), Khan (2007), and Tharaldsen et al. (2010) found that masculinity was negatively related to safety knowledge and behavior. Anicich et al. (2015) found that masculinity had a small, but positive relationship with occupational fatalities. However, Håvold (2007) found that masculinity was positively associated with safety knowledge, compliance, and behavior. Nielson et al.'s (2015) results utilizing three measures of masculinity were inconsistent in their relationships with safety violations, safety oversights, and perceptions of the priority placed on safety. Likewise, results from national-level analyses vary. Infortunio (2002), Park (2011), and Soeters and Boer (2000) found that masculinity was negatively associated with fatal work injuries, man-made disasters, and accident rates, whereas Keser et al. (2015), Özkan and Lajunen (2007), and Reniers and Gridon (2013) found that masculinity was positively associated with fatal work injuries.

Long-term orientation. In comparison to the previous cultural values, a much smaller number of studies examined relationships between long-term orientation and measures of safety constructs. Relationships respective to risk perception and safety climate indicated that long-term orientation was positively associated with both

constructs (Habibnezhad & Esmaeili, 2016; Okilie & Okoye, 2012; Reader et al., 2015). However, results concerning the relationship between long-term orientation and safety behavior varied (Alshahrani et al., 2015; Hetherington, 2007; Khan, 2007). Only Özkan and Lajunen (2007) examined the relationship between long-term orientation and occupational fatalities at the national level and found that long-term orientation was positively related to fatal work injuries.

Cross-cultural safety study limitations. Limitations of previous cross-cultural safety research hinder the degree to which definitive conclusions can be made about the relationships between Hofstede's (1980, 1991) cultural value dimensions and workplace safety constructs. Understandably, previous results are inconsistent especially regarding relationships at the psychological level of analysis. Many studies provide little to no theoretical rationale or even hypotheses concerning the relationships between cultural values and safety constructs (for exceptions see: Hetherington, 2007; Infortunio, 2003; Khan, 2007; Lu et al., 2012). Exploratory studies with little theoretical rationale are useful as a preliminary step when examining a previously untested relationship or research area, however, studies with a theoretical basis offer greater opportunity to advance further scientific knowledge (Colquitt & Zapata-Phelan, 2007). The current literature lacks theoretical propositions to guide analyses of specific cross-cultural safety relationships. This study seeks to address this limitation by presenting theoretical rationale for the relationships between cultural values and safety constructs and directly examining those relationships.

Another limitation of the extant literature is the use of contaminated measures of Hofstede's values and/or safety constructs. Conclusions concerning the meaning of the relationships between contaminated measures of cultural values and safety variables are difficult if not impossible to make because contaminated measures introduce construct-irrelevant variance. For instance, Ali and Mohamed (2010) developed a measure of safety management practices and conducted a factor analysis, which revealed a two-factor solution, labeled as strategic and operational practices. However, further examination of their items suggests some overlap with the safety climate content domain (e.g., "Communication channels used by company prove to be highly effective in promoting safety in the workplace;" "The company has a highly effective training program for workers"). Similarly, Ali and Mohamed (2010) used a combined measure of power distance and femininity, rather than measuring each dimension separately. It is difficult to make accurate conclusions about the relationships between constructs in their study given these considerations.

Likewise, Mohamed et al. (2009) developed a broad measure of safety climate, which they then correlated with individual measures of Hofstede's cultural dimensions. A factor analysis of their safety climate measure supported a three-factor solution, which they labeled as awareness and beliefs, physical work environment, and supportive environment. However, an examination of their items reveals that they overlap with the content domain of multiple safety-related constructs, including perceptions of risk (e.g., "My job carries a considerable level of risk."), and risk tolerance (e.g., "I find working with a certain amount of risk exciting."), safety climate (e.g., "Working safely is the top

priority for site managers, foremen, and supervisors."), and safety knowledge (e.g., "I am aware of my trade relevant safety procedures.").

Cultural Values and Safety Constructs

Conceptual descriptions of culture (Erez 1994, 1997; Locke, 1991; Schneider, 1987; Schneider et al., 2013) and the previously described cultural frameworks (Erez & Gati, 2004; Oyserman & Uskul, 2008) were utilized as the theoretical basis for the relationships between cultural values and safety constructs. These purported relationships are integrated in a multilevel cross-cultural workplace safety framework based on Christian et al. (2009) and Nahrgang et al.'s (2011) safety models (Figure 3). The following section presents theoretical rationale for the relationships between cultural values and safety and a description of the cross-cultural safety framework and hypotheses inherent therein.

Relationships among safety constructs. Relationships among safety predictors, knowledge and motivation, behavior, and outcomes in the cross-cultural safety framework align with Christian et al.'s (2009) model, which was founded on common theoretical understandings in the safety literature (i.e., Griffin & Neal, 2000; Neal & Griffin, 2002). Griffin and Neal (2000) relied on theories of job performance (Borman & Motowidlo, 1993; Campbell, McCloy, Oppler, & Sager, 1993) in the development of their safety framework to contend that safety motivation and knowledge directly influence safety behavior and in turn outcomes. Neal and Griffin (2004) and Christian et al. (2009) also identified a number of safety-related individual and situational factors that are distally related to performance and outcomes based on their relationship with

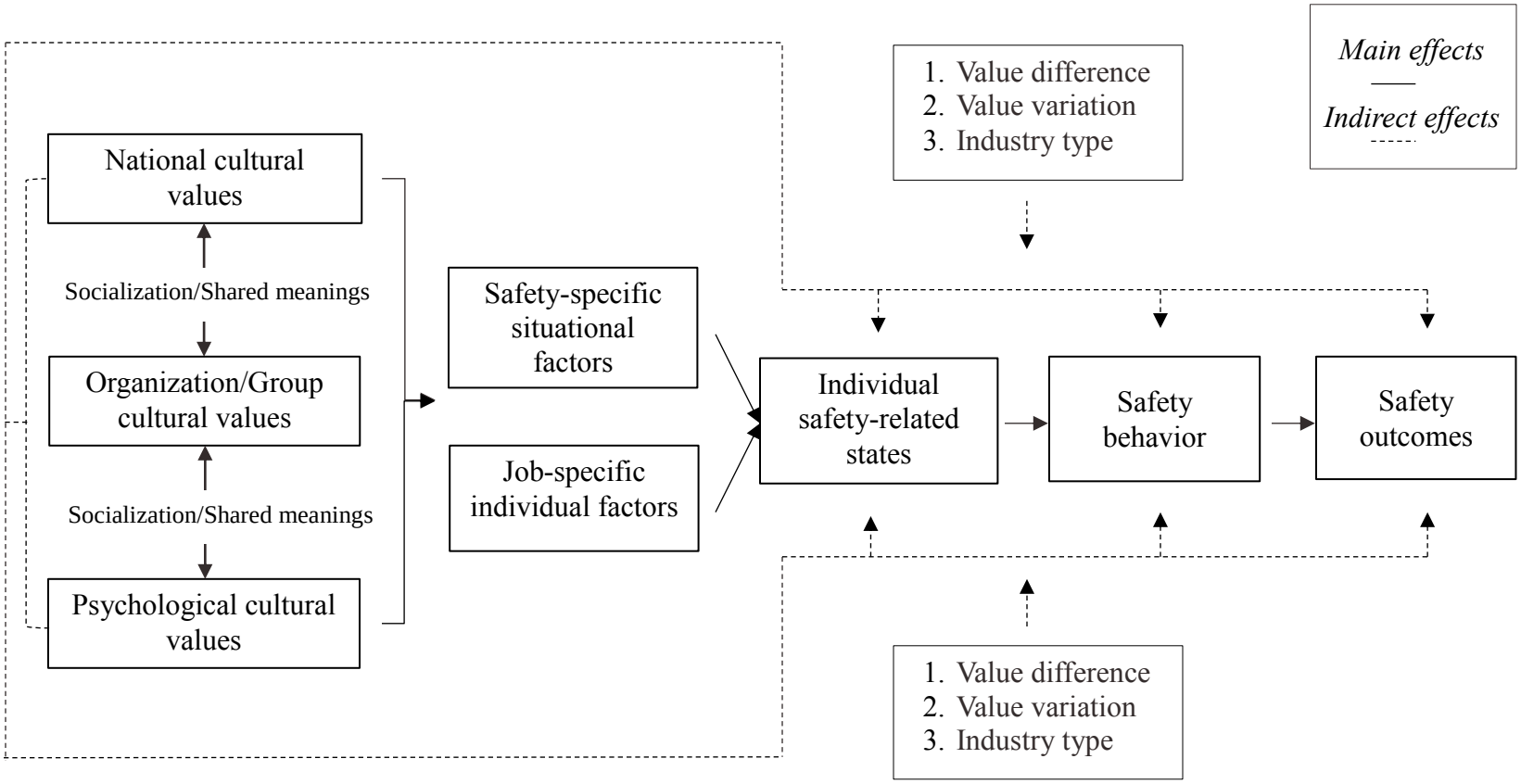

Figure 3. A multilevel cross-cultural workplace safety conceptual framework.

individual safety knowledge and skills and safety motivation (i.e., safety climate, leadership, personality, job attitudes). Nahrgang et al. (2011) integrated additional situational factors (i.e., social support, risk and hazards) and general individual factors (engagement, burnout) in their safety model, which are likewise incorporated in the cross-cultural safety model, however, the primary relationships of interest in this study are among cultural values and safety constructs, rather than general work constructs (i.e., job specific individual factors: personality, satisfaction, engagement, burnout).

Relationships among cultural values. Relationships among cultural values at the national, organizational/group, and psychological level are based theoretically on Erez and Gati's (2004) and Oyserman and Uskul's (2008) multilevel process models of culture. Erez and Gati's (2004) multilevel model of culture accounts for the nested nature of individuals acting within the organizational and national context and suggest that processes at higher levels affect change at lower levels and vice versa. Socialization and social learning (i.e., modeling and observation) is the process by which cultural values at the national level become represented at the organizational/group level, and in turn individual-level cultural values (Bandura, 1986; Erez, 2011). Similarly, Oyserman and Uskul (2008) contend that individually internalized culture, including psychological cultural values, are directly influenced by distal culture (e.g., nationally shared cultural values).

Psychological cultural values also affect group/organizational cultural values and national cultural values through bottom up processes (Erez, 2011; Schneider, 1987). Specifically, individual cultural values affect changes at the group/organizational and

national levels through shared meanings that aggregate to these levels (Erez, 2011). In the organizational context, this has connections to Schneider's (1987) attraction-selection-attrition model. That is, the attributes and behavior of the employees contained within organizations are the ultimate determinants of organization behavior and employees become more homogeneous over time through the process of attraction, selection, and attrition.

Theoretical relationships between cultural values and safety. Cultural values at the psychological, organizational/group, and national level are specifically linked to safety constructs based on theory concerning motivation and goal setting (Erez, 1994, 1997; Locke, 1991), the attraction-selection-attrition model (Schneider, 1987), and organizational culture and climate (Schneider et al., 2013). Psychological cultural values are purported to influence safety climate, leadership practices, social support, and risk and hazards by directing employees' attention to particular aspects of their work environment and influencing their interpretation of the organizational policies, practices, and procedures they observe (Erez, 1994). Further, the attraction-selection-attrition model suggests that psychological cultural values within organizations become more homogeneous over time and subsequently shape the organizational context (Schneider, 1987). National cultural values and organizational cultural values are purported to influence safety constructs by directly shaping organizational policies, practices, and procedures that serve as the basis for safety perceptions (Aumann & Ostroff, 2006; Kopelman, Brief, & Guzzo, 1990). This top-down process begins with global and national culture, which in turn influence organizational culture, and the assumptions,

values, and beliefs upon which organizations are founded (Erez & Gati, 2004; Schneider et al., 2013).

Further, early theorizing by Rokeach (1973) and Locke (1991) incorporate values as essential aspects of the motivation process. Rockeach (1973) referred to values as "the cognitive representations and transformations of needs" (p. 20). Locke (1991) described the importance of values in his model of the motivation sequence, as the link between needs and action. As he stated, "values motivate action" (p. 291). Moreover, values are fundamental to goal setting theory, such that goals are the application of values to specific situations (Locke, 1991). Erez's (1994, 1997) culture-based model of work motivation expanded on this notion to include cultural values in the motivation process. According to her model, cultural values influence the motivational impact of managerial practices and directly influence self-derived motives of enhancement, efficacy, and consistency, which are subsequently linked to work behavior. Accordingly, national, organizational/group, and psychological cultural values are expected to be indirectly related to safety motivation and in turn safety knowledge acquisition, behavior, and outcomes because of their influence in the goal setting process, on self-derived motives, and the motivational potential of managerial practices.

Direct and indirect relationships. Theory concerning culture and social adaptation and the previously described cultural frameworks provide guidance concerning direct and indirect relationships between national, organizational/group, and psychological cultural values and psychological attitudes and behavior and thus the order of these variables in the conceptual framework. The value/belief theory of culture

contends that values are fundamental to culture and govern culturally appropriate attitudes and behavior (Hofstede, 1980; Triandis, 1995). Social adaptation theorists (Homer & Kahle, 1988; Kahle, 1983) argue that values are prototypes for attitudes and behavior (i.e., the value-attitude-behavior hierarchy). Likewise, Oyserman and Uskul (2004) argue that national and psychological cultural values are direct influences of individual attitudes and behavior. Results from Taras et al. (2010) further suggest that cultural values are distally related to job performance via their influence on emotions, attitudes, and behavior. Cultural values are accordingly integrated in the model as distally related to safety outcomes via their direct influence on safety-specific situational factors and general individual factors. Likewise, cultural values at the national, organizational/group, and psychological level should be more strongly related to safety-specific situational factors and job-specific individual factors, than individual safety-related states, safety behavior, and safety outcomes.

***Hypothesis 1*:** Cultural values will be more strongly related to safety-specific situational factors and job-specific individual factors than individual safety-related states.

***Hypothesis 2*:** Cultural values will be more strongly related to individual safety-related states than safety behavior.

***Hypothesis 3*:** Cultural values will be more strongly related to safety behavior than safety outcomes.

Effect size differences among national, organizational/group, and psychological safety values. National, organizational/group, and psychological cultural values are conceptually and empirically distinct, but understandably linked (Erez, 1994; Taras et al., 2010). Likewise, there are similar, but distinct theoretical explanations for the effect of national cultural values, organizational/group cultural values, and psychological cultural values on safety constructs. Theoretical and conceptual rationale suggests that cultural values at these various levels should have similar patterns of relationships with safety constructs. However, given their distinction, effect sizes between national cultural values, organizational/group cultural values, and psychological cultural values and safety constructs are expected to differ. Fittingly, results from Taras et al. (2010) provide support for the distinction between national and psychological cultural values based on differences in their relationships with organizational constructs.

***Hypothesis 4*:** Correlations between psychological, organizational/group, and national cultural values and safety constructs will differ.

Primary Hypotheses

A primary focus of this study and main hypotheses are the relationships between Hofstede's (1980, 1991) cultural value dimensions and safety constructs (i.e., safety-specific situational factors [risk and hazards, social support for safety, leadership about safety, safety climate], individual safety-related states [safety motivation, safety knowledge], safety behavior [compliance, participation] and outcomes). National, organizational/group, and psychological cultural values are appropriately examined and conceptualized in this study as distinct constructs, however, they are expected to have

similar patterns of relationships with safety variables; only the strength of their relationships are expected to differ. In the following section, cultural values at the national, organizational/group, and psychological levels are linked to the previously described safety constructs. Considering the patterns of relationships are expected to be consistent across these levels, hypotheses are presented in the following discussion irrespective of the level of analysis (i.e., the national, organizational/group, and psychological cultural value distinction).

Individualism-collectivism and safety relationships. Individualism-collectivism describes how individuals view themselves in relation to the collective other (Hofstede, 1980, 1991). Collectivists view themselves interdependently, act according to social norms and group goals, and highlight the importance of good interpersonal relationships. Individualists view themselves as autonomous and independent and act according to individual values, beliefs, and goals (Markus & Kitayama, 1991; Triandis, 1995).

Individualists in the work environment are open in their communication and prefer a participative leadership style (Taras et al., 2010). Those who are more collectivistic view themselves as a part of a collective group and focus on maintaining group harmony above task completion (Hofstede, 1991; 2001). Individualistic organizational practices include management that focuses on individual success and task completion above maintaining personal relationships and involve empowerment, delegation of authority, participation in decision making, and support for innovation (Aumann & Ostroff, 2006; Hofstede, 1991, 2001; Taras et al., 2010). Collectivistic

management practices, in comparison, involve the management of groups above the concerns of individual employees with expectations of conformity (Hofstede, 2001; Taras et al., 2010). Further, collectivistic cultures are "high-context," in that information is often not made explicit (Hall, 1976).

Accordingly, individualism should be positively associated with safety perceptions, safety knowledge and participation, and in turn safety behavior. Individualists are less concerned with maintaining group harmony by openly communicating their safety concerns and identifying and addressing issues with safety policies and the behavior of their peers, and individualistic organizational practices involve more explicit safety communication (Reader, Noort, Shorrock, & Kirwan, 2015; Soeters & Boer, 2000). However, collectivism is also characterized by strong social support and conformity (Triandis et al., 1985), which should be positively related to perceptions about support from others and compliant safety behavior. Consequently, it is hypothesized that individualism will have a positive, but weak relationship with safety constructs. The positive association between individualism and safety will be particularly weak for social support and safety compliance.

***Hypothesis 5*:** Individualism will be positively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.

***Hypothesis 6*:** Individualism will be negatively related to (a) risk and hazards and (b) safety outcomes.

Power distance and safety relationships. Power distance is defined by the extent to which individuals accept social hierarchy and unequal distribution of power within society (Hofstede, 1980, 1991). Those high on power distance are conscious of and respectful to those with greater power, while those low on power distance are less attentive to power status (Hofstede, 1991, 2001). In the organizational context, power distance is associated with the degree of dependence between managers and their subordinates (Hofstede, 1991). For those low on power distance, the relationship is independent, such that "subordinates will quite readily approach and contradict their bosses" (Hofstede, 1991, p. 27). Employees who are high on power distance expect to be managed closely by their superiors and typically told what to do (Hofstede, 2001; Taras et al. 2010). Power distance is also associated with a strictly centralized and hierarchical organizational structure that reflects the inequality between those in higher and lower positions (Hofstede, 1991, 2001). As a result, flow of information is constrained by the hierarchy.

In the context of safety, power distance is purported to be associated with less open communication and involvement, including communicating observed safety issues and concerns (Anicich, Swaab, & Galinsky, 2015; Reader et al., 2015; Soeters & Boer, 2000). Those low on power distance are more likely to openly discuss safety and act on issues without requiring approval from their superiors (Lu et al., 2012; Reader et al., 2015; Soeters & Boer, 2000). Similarly, organizational practices associated with high power distance are expected to discourage input from those employees for whom safety is most relevant and limit the dissemination of safety knowledge to all employees.

***Hypothesis 7*:** Power distance will be negatively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.

***Hypothesis 8*:** Power distance will be positively related to (a) risk and hazards and (b) safety outcomes.

Uncertainty avoidance and safety relationships. Uncertainty avoidance refers to the degree to which individuals share the view that ambiguity is threatening and seek to limit uncertainty by following strict rules and guidelines for behavior (Hofstede, 1991, 2001). In the workplace, individuals low and high on uncertainty avoidance differ with respect to their concern for (1) rules (i.e., only as many rules as necessary vs. an emotional need for rules irrespective of their necessity), (2) time (i.e., time as an orienting factor vs. time as essential ["Time is money"]), (3) hard work (i.e., work hard only when necessary vs. an inner need to work hard), (4) precision and punctuality (i.e., precision and punctuality must be learned vs. come naturally), (5) tolerance for deviant ideas and behavior (i.e., a high degree of tolerance vs. suppression), and (6) motivation (i.e., achievement vs. security).

Aspects of uncertainty avoidance in the workplace suggest both positive and negative effects of uncertainty avoidance on safety perceptions and behavior. For instance, those high on uncertainty avoidance should be motivated to provide stability and limit unanticipated safety outcomes and risk, and seek to acquire new information about safety as a means of reducing unexpected problems (Lu et al., 2012; Park, 2011). However, the positive influence of uncertainty avoidance on safety motivation is likely

to be superseded by an overreliance and knowledge about safety based on strict rules and regulations that are not applicable in all potential situations (Burke, Chan-Serafin, Salvador, Smith, & Sarpy, 2008). Further, Noort et al. (2015) contended that lower uncertainty avoidance leads to more positive safety perceptions because managers and coworkers are (1) open in their communication about safety issues, (2) receptive to differing opinions and novel ideas about improving safety, (3) less constrained by current safety policies, and (4) more encouraging about reporting mistakes. Burke et al. (2008) argued that high uncertainty avoidance is likely to result in standardized, structured training approaches, which limit comprehensive safety knowledge that an unstructured approach (e.g., role-playing, scenario simulations) is more likely to address (Burke et al., 2008). Thus, the negative effect of uncertainty avoidance on safety constructs should be strongest for safety knowledge and participation and weakest for safety motivation and compliant behavior.

> ***Hypothesis 9*:** Uncertainty avoidance will be negatively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.
>
> ***Hypothesis 10*:** Uncertainty avoidance will be positively related to (a) risk and hazards and (b) safety outcomes.

Masculinity-femininity and safety relationships. Masculinity-femininity reflects cultural values based on dominance (e.g., success, money) vs. caring for others, quality of life, and cooperation (Hofstede, 1980, 1991). Hofstede (1991) further described this distinction as "masculinity pertains to societies in which social gender

roles are clearly distinct . . . femininity pertains to societies in which social gender roles overlap" (pp. 82-83). Masculinity and femininity are differentiated in the work environment based on the degree to which work is a fundamental aspect of life ("live in order to work" vs. "work in order to live," Hofstede, 2001). Employees higher on masculine values view work as more fundamental and subsequently have ambitious career aspirations, and focus on success in their job, attaining more security, and higher pay.

Masculinity is expected to be a detriment to safety perceptions of social support and communication because masculine values are associated with less effective communication and trust, and more conflict (Lu et al., 2012; Reader et al., 2015). Additional behavior associated with masculinity includes working fast to meet a deadline or quota irrespective of safety considerations, greater propensity for risk taking behavior, and self-reliance (Mearns & Yule, 2009; Nielson, Hansen, Bloksgaard, Christensen, Jensen, & Kyed, 2015). Further, employees lower on masculinity are likely to be more motivated to behave safely and seek out safety knowledge in order to ensure that they can live out their non-working lives (e.g., family life). Fittingly, organizational practices associated with less masculinity involve more social considerations, including the promotion of employee welfare, relationships, and collaboration (Aumann & Ostroff, 2006).

> ***Hypothesis 11*:** Masculinity will be negatively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.

***Hypothesis 12*:** Masculinity will be positively related to (a) risk and hazards and (b) safety outcomes.

Long- vs. short-term orientation and safety relationships. Long-term orientation differs from short-term orientation in the importance placed on future rewards and perseverance, rather than respect for tradition and social obligations (Hofstede, 2001). Those who are more short-term oriented are concerned with saving face, respectful of social status, and follow traditions (Hofstede, 1991, 2001). Organizational practices characterized by a long-term orientation involve flexibility and adaptability to ensure long-term stability, such as rewarding employees for addressing long-term problems and issues (Aumann & Ostroff, 2006).

Short-term orientation is expected to have a negative effect on safety because employees are more likely to ignore safety issues and particularly their own mistakes in order to save face and avoid shame, and focus on immediate safety issues rather than those safety considerations that have distal effects (Lu et al., 2012; Reader et al., 2015). Accordingly, long-term orientation is expected to foster better safety perceptions and more participatory behavior through (1) flexible and adaptive safety policies, (2) more planning and perseverance to attain long-term safety goals, and (3) greater opportunity to address safety issues before they occur (Reader et al., 2015).

***Hypothesis 13*:** Long-term orientation will be positively related to related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.

***Hypothesis 14*:** Long-term orientation will be negatively related to (a) risk and hazards and (b) safety outcomes.

Proposed Moderators

The previous discussion in combination with mixed results from prior examinations of cultural values and safety suggest the presence of moderators. The first proposed moderators of the relationships between cultural values and safety constructs are national-organizational cultural value congruence/difference and organizational cultural value variation. Both of these moderators are based on the person-environment fit literature, the focus of which is the compatibility between employees and their work environment (Dawis & Lofquist, 1984; Kristof-Brown, Zimmerman, & Johnson, 2005). Person-environment fit is founded on Lewin's (1951) contention that behavior is a function of the interaction between individual characteristics and environmental or situational considerations. Compatibility between individuals and their environment leads to positive outcomes because the environment provides an opportunity to fulfill individual needs and utilize skills and abilities (Dawis & Lofquist, 1984).

Researchers have acknowledged cultural value fit in models of cultural values and organizational attitudes and behavior (Aumann & Ostroff, 2006; Aycan, Kanungo, & Sinha, 1999). The effectiveness of organizational practices as related to positive employee attitudes and behavior depends in part on how well those practices align with individually and nationally held cultural values (Aumann & Ostroff, 2006; Newman & Nollen, 1996; Robert, Probst, Martocchio, Drasgow, & Lawler, 2000). For instance, a high level of national or psychological individualism is consistent with safety

management practices that promote employee involvement and input. Fittingly, Newman and Nollen (1996) found that workgroup performance was higher when management practices were more congruent with Hofstede's national cultural values. Likewise, Robert et al. (2000) examined the fit between managerial practices and cultural values (i.e., practice-culture fit) and found that the relationship between employee satisfaction and empowerment as well as continuous improvement varied for samples of individuals from different countries.

In accordance with person-organization fit research (Arthur, Bell, Villado, & Doverspike, 2006; Kristof-Brown et al., 2005) and conceptualizations of cultural value fit (Aumann & Ostroff, 2006), incongruence between organization and national cultural values is expected to have negative effects on safety. Positive relationships between cultural values and safety constructs are expected to be weaker and negative relationships are expected to be stronger when national-organizational cultural values are more discrepant.

***Hypothesis 15a*:** Positive relationships between cultural values and safety constructs will be weaker when there is greater difference between national-organizational cultural values.

***Hypothesis 15b*:** Negative relationships between cultural values and safety constructs will be stronger when there is greater difference between national-organizational cultural values.

A similar moderator is organization cultural value variability, or the variation within organizations on cultural values. This moderating condition is analogous to

cultural tightness-looseness, which is a national-level construct defined as "the strength of social norms and the degree of sanctioning within societies" (p. 1226, Gelfand et al., 2006). Those societies characterized as tight exhibit strong social norms (e.g., unilineal kinship [descent is traced to male or female]) and little tolerance for deviant behavior, whereas culturally loose societies exhibit norms that are less formal (e.g., bilateral kinship [descent traced to both males and females]) and less strictly controlled (Gelfand et al., 2006). Taras et al.'s (2010) meta-analysis found that cultural tightness strengthened relationships between cultural values and organizational outcomes. This moderator is also analogous to organizational climate strength; that is, the extent to which employees within-units have similar climate perceptions (Schneider, González-Romá, Ostroff, & West, 2017). The person environment fit literature and research on cultural value fit in combination with discussion and research on cultural tightness-looseness and climate strength suggest that safety will be negatively affected when there is more variability in cultural values among employees within organizations.

***Hypothesis 16a*:** Positive relationships between cultural values and safety constructs will be weaker when there is greater within-organization variability in cultural values.

***Hypothesis 16b*:** Negative relationships between cultural values and safety constructs will be stronger when there is greater within-organization variability in cultural values.

Industry type. Researchers have examined the cultural value and safety relationship for a variety of industries including aviation (e.g., Soeters & Boer, 2000),

construction (e.g., Mohamed et al., 2009), manufacturing (Khan, 2007), medical (e.g., Nielson et al., 2015), oil and gas (e.g., Mearns & Yule, 2009), and shipping (e.g., Håvold, 2005). Previous research suggests that the relationships among safety constructs vary across industries. For instance, Nahrgang et al.'s (2011) meta-analysis found that the effect of safety predictors on burnout and engagement was moderated by industry type (i.e., construction, health, manufacturing, and transportation).

Likewise, the relationships between cultural values and safety constructs might vary according to the characteristics of industries as they influence the importance of psychological, organizational, and national cultural values. For instance, the conformity and compliance associated with collectivism are argued to be particularly influential as related to safety in the shipping industry, where individuals work in a "closed social milieu," and can only rely on the competence of those aboard their vessel (Håvold, 2007; Lu et al, 2012). Lu et al. (2012) also proposed that aspects of uncertainty avoidance (i.e., following standard procedures, lack of innovation) lead to positive perceptions of safety and behavior and fewer negative outcomes in the shipping industry because ships face similar hazards with few novel or unexpected events. In the aviation industry, open communication among flight teams, including addressing those with more senior level positions (e.g., captains) is important for performing safely, which suggests that the relationships between power distance and safety constructs are likely to be particularly strong in aviation (Soeters & Boer, 2000). However, crew resource management training is utilized in aviation to reduce the negative effects of power distance in flight teams (Salas, Wilson, Burke, & Wightman, 2006). The moderating effects of industry type are

posed as research questions given these considerations and limited discussion of differences in the cultural value and safety construct relationships across industries.

***Research Question 1a*:** Do the relationships between psychological cultural values and safety constructs vary across industries?

***Research Question 1b*:** Do the relationships between organizational/group cultural values and safety constructs vary across industries?

***Research Question 1c*:** Do the relationships between national cultural values and safety constructs vary across industries?

2. METHOD

The current study assessed the hypothesized relationships between cultural values and safety constructs and proposed moderators based on a meta-analysis of previous research. Population correlations between cultural values at the psychological, cross, and national level and safety constructs were estimated using Hunter and Schmidt's (2004) psychometric meta-analytic procedures, followed by an examination of hypothesized moderators of these relationships.[1]

Inclusion Criteria and Literature Search

Studies were included in the meta-analysis if they met each of the following criteria: (1) empirically examined the relationship between at least one of Hofstede's (1980, 1991) five cultural dimensions and a safety construct (i.e., safety motivation, knowledge, compliance, participation, climate [or culture], safety-related leadership and social support, or risk and hazards), (2) reported the correlation between at least one of Hofstede's cultural values and a safety construct or provided enough information to compute a correlation coefficient (e.g., *t* value, means and standard deviations), and (3) reported the sample size associated with the specified relationship. As noted previously, leadership and social support are not safety-specific constructs, however, in the current meta-analysis only those studies that explicitly measured leadership and social support concerning safety were included. Additionally, only studies that examined the relationship between Hofstede's dimensions and measures of workplace safety were included; articles relevant to personal safety (e.g., driving safety, pedestrian safety) are

[1]Only one previous study examined the relationships between cultural values and safety at the organizational level of analysis (Burke et al., 2008) and none at the group level.

not work-specific and consequently were not eligible for inclusion (see also Christian et al., 2009). Indeed, research suggests that the antecedents of driving accidents differ from workplace incidents (Iversen & Rundmo, 2002; Wagenaar, 1992).

Primary studies were identified based on a search of *GoogleScholar* and *ProQuest Dissertations and Theses*.[2] These databases were searched using combinations of terms relevant to national culture (i.e., *national culture*, *cross-culture*, *cross-cultural*, *Hofstede*, and *cultural values*) and safety (i.e., *safety*, *injuries*, *accidents*, and *fatalities*). Unpublished work was identified through a search of relevant conference programs (i.e., Society for Industrial and Organizational Psychology, Academy of Management, Work, Stress, and Health, and Human Factors and Ergonomics Society) from the past 10 years. The MetaBUS portal was also searched for relevant data (Bosco, Uggerslev, & Steel, 2017). In addition, summary articles of cultural values and safety were also reviewed (e.g., Hodgson et al., 2013; Mearns & Yule, 2009; Strauch, 2010), as well as meta-analyses of Hofstede's dimensions with various other psychological constructs (i.e., Oysterman et al., 2002; Taras et al., 2010). Those authors or coauthors who contributed at least two sources were individually contacted for other published or unpublished research. Finally, authors of studies that provided some requisite information, but lacked other information (e.g., studies using multiple regression that do not report intercorrelations) were contacted to request the necessary information.

The literature search and review process resulted in the identification of 30 studies (19 published articles, 6 dissertations/theses, 3 conference papers, and 2

[2] This search was confined only to sources published in English.

unpublished datasets) that met the inclusion criteria and 416 associated correlations. See Appendix B for a detailed flowchart of the literature search, review, and coding process. A majority of the identified studies examined relationships with individualism (22 studies, k = 97), followed by power distance (20 studies, k = 95), uncertainty avoidance (20 studies, k = 85), masculinity (18 studies, k = 82), and long-term orientation (10 studies, k = 54). Additionally, most studies examined cultural value and safety relationships at the individual level (16 studies, k = 228), followed by cross-level analyses (8 studies, k = 135) and national-level analyses (8 studies, k = 107).

Coding

Each study was coded for sample size, effect size (e.g., correlation coefficients), cultural value and safety construct measure information (i.e., study construct label, reliability information [coefficient alpha]), level of analysis, job title, industry, cultural value mean and standard deviation, safety climate dimension, organization country, and other aspects of the sample (i.e., sex, age). See Appendix C for the study coding sheet. The coding of individualism-collectivism warrants further discussion because individualism-collectivism is often measured and conceptualized as two independent constructs (e.g., Markus & Kitayama, 1991). In Taras et al.'s (2010) review, they found that many collectivism items are negatively worded items from measures of individualism and accordingly maintained consistency with Hofstede's conceptualization of individualism-collectivism as existing on a single continuum. Following from their work, assessments of collectivism were recoded to reflect a single individualism-collectivism continuum by inversing the sign of effect sizes. Likewise, studies that

measured a cultural value so that higher scores reflected more of the opposite end of a cultural value continuum (e.g., femininity, short-term orientation) were reverse coded.

The author completed the literature search and the identification and coding of all primary studies. An advanced undergraduate student was then trained to also complete the coding of all primary studies. This process first involved a detailed discussion and review of the aims of the meta-analysis, coding criteria, and coding sheet (Appendix C). The first and second coder then met to review and code two studies together to ensure that the second coder had the requisite knowledge to accurately code. The second coder then coded an initial set of five studies; the overall agreement between the first and second coder for these five studies was 96.04%. The second researcher then completed the coding of all studies. The first and second coder met periodically and resolved any discrepancies in the coding through a discussion and review of the specific source (see Appendix D for a complete list of study information and effect sizes for those sources retained in the meta-analysis).

Meta-analytic Procedures

Hunter and Schmidt's (2004) psychometric meta-analytic procedures were used in this study, which tends to provide the best estimates when correcting for study artifacts (Hall & Brannick, 2002). Individual correlations were corrected for sampling error and attenuation in measures of cultural values and safety constructs. A fundamental aspect of meta-analysis is correcting for sampling error because individual samples are not a complete representation of an entire population of interest, which introduces sampling error variance (Arthur, Bennett, & Huffcutt, 2001; Hunter & Schmidt, 2004).

The second study artifact that was corrected for was error in the measurement of cultural values and safety constructs. Measurement error attenuates effect sizes because the reliabilities of scores on measures vary across studies (Hunter & Schmidt, 2004). Effect sizes can be corrected for measurement error individually provided each study reported the requisite reliability information; however, measure reliability is often sporadically reported (Hunter & Schmidt, 2004). In this meta-analysis, individual corrections were made for measurement error when reliability information was provided. When a study did not report the reliability information, correlations were corrected for measurement error using artifact distributions (Table 3). That is, this study used a mixed method to correct for measurement error, which is common practice in psychometric meta-analysis (Schmidt & Hunter, 2011).

National-level cultural values were not corrected for measurement error because reliabilities are often not reported and reliability information from individual-level data is not appropriate for correcting aggregated effect sizes (Wallace, Edwards, Paul, Burke, Christian, & Eissa, 2016). That is, cultural values at the cross and national levels were not corrected for measurement error, nor were national-level safety constructs. Additionally, no correction was made for measurement error in safety outcomes (i.e., injuries, incidents, near misses, accidents) since reliability information is commonly not provided as measures of outcomes are often assessed based on counts (Beus et al., 2010). The results in turn speak to the theoretical relationships between cultural values and safety constructs at the psychological level, and the operational relationships between

Table 3

Average Measure Reliabilities Used for Artifact Distributions at the Psychological Level

Construct	**Mean reliability**
Individualism	.80
Power distance	.58
Uncertainty avoidance	.75
Masculinity	.73
Long-term orientation	.80
Risk and hazards	–
Social support for safety	–
Safety-specific leadership	.86
Safety climate	.81
Safety motivation	.87
Safety knowledge	.89
Safety behavior – Composite	.80
Compliance	.80
Participation	.83

cultural values and safety at the national level (Schmidt & Hunter, 2011; Society for Industrial and Organizational Psychology, 2003).

Various meta-analytic estimates were computed and reported, including sample-weighted mean correlations and sample-weighted standard deviations. Additional estimates included sample-weighted mean correlations corrected for measurement error and 95% confidence intervals and 80% credibility intervals around those estimates, and standard deviations of the corrected correlations. Confidence intervals provide an indication of the degree to which sampling error affects the population means (Hunter & Schmidt, 2004). A large confidence interval suggests that a large portion of the error in the population estimate is due to sampling error. In comparison, credibility intervals

provide information about the range of population correlations and whether moderators are present (Whitener, 1990). A wide credibility interval and/or one that includes zero suggests the presence of moderating variables (Hunter & Schmidt, 2004; Whitener, 1990).

Level of analysis. Corrected correlations for psychological-, cross-, and national-level analyses were reported separately considering their conceptual differences and the importance of distinguishing between levels of analysis (Ostroff & Harrison, 1999). Psychological-level and cross-level effect sizes were combined to examine the proposed moderators primarily to provide more comprehensive estimates as not all effect sizes and associated studies at these levels reported enough information to assess the hypothesized moderators (see Taras et al., 2010).

Number of primary studies. Meta-analytic estimates can be computed using as few as two primary studies (Pigott, 2012; Valentine, Pigott, & Rothstein, 2010). Correspondingly, corrected effect size estimates were computed and reported if at least two studies examined a cultural value-safety construct relationship. However, corrected correlations based on limited primary studies are likely poor estimates of the true relationships between variables.

Publication bias. Publication bias is a concern in meta-analysis when studies with small and/or non-significant effects are underrepresented (Kepes, Bank, McDaniel, & Whetzel, 2012). In an attempt to address this issue, individual researchers were contacted who contributed to at least two studies and conference presentations were reviewed in order to ensure that relevant unpublished work was identified. Publication

bias was also examined directly using the PUB_BIAS macro for SAS[3], which computes the Begg rank correlation, Egger regression, funnel plot regression, and trim and fill procedures (Rendina-Gobioff & Kromrey, 2006). These publication bias methods have been used in recent meta-analyses (e.g., Triana, Jayasinghe, & Pieper, 2015) and their use is consistent with discussions of assessing publication bias by triangulating methods (Schmidt & Hunter, 2015).

Examination of Moderators

Industry type and two additional proposed moderators (i.e., organization region [West. vs. non-West] and safety climate operationalization) were examined using Hunter and Schmidt's (2004) subgroup analysis. Separate meta-analyses were conducted for each moderating condition and credibility and confidence intervals (80% and 95%, respectively) were used to determine differences between the conditions (Whitener, 1990). A credibility interval for a moderator that does not include zero suggests that there are no further moderators in the subpopulation to be examined (Whitener, 1990). Further, moderation was supported based on a comparison of the confidence intervals for each moderating condition (Hunter & Schmidt, 2004). Nonoverlapping confidence intervals indicate that there was a meaningful difference between conditions in their relationships with a safety construct.

[3]The PUB_BIAS macro was developed for assessing publication bias in meta-analysis with the *d*-statistic as the effect size of interest. Dr. Kromrey was contacted directly to request the PUB_BIAS macro for correlation coefficients. He instead provided a conversion formula to convert the correlations into equivalent *d*-values (Aaron, Kromrey, & Ferron, 1998), which was the approach taken in the current study.

The moderating effects of value difference and value variation were examined using weighted-least squares regression (Hedges & Olkin, 1985; Steel & Kammeyer-Mueller, 2002). These analyses involved entering moderators into regression equations in the prediction of the uncorrected effect sizes, which were weighted based on the inverse square root of the sampling error (Aguinis, Gottfredson, & Wright, 2010; Arthur et al., 2001; Hedges & Olkin, 1985; Steel & Kammeyer-Mueller, 2002).

National-organizational culture value difference. Cultural value fit was assessed as the objective fit between organization and national cultural values using the *person-person* approach, which follows from Schneider's (1987) attraction-selection-attrition model and the contention that the attributes of individual employees combine to represent organizational attributes (Kristof-Brown & Guay, 2011). This approach is common for measuring a variety of different fits and often involves computing the correlation or difference between individual scores and the aggregate of individual scores using the same scale (Arthur et al., 2006; Kristof-Brown & Guay, 2011). National-organizational value fit was calculated based on the absolute value of the standardized difference (i.e., *d* statistic) between aggregates of psychological or national cultural values (assigned to individuals) within each sample and standardized national cultural value scores (Taras, Steel, & Kirkman, 2012) (Table 4). For example, Khan (2007) reported a mean of 6.32 and standard deviation of 2.08 on individualism for a sample of 254 employees at a U.S. manufacturing company. This information was used to calculate the standardized difference between sample/organizational individualism

and national individualism (i.e., mean = 0.42, standard deviation = 1.00, *n* = 78,701; Taras et al., 2012). The absolute *d* for that sample and cultural value was 5.88.

Organization cultural value variation. Sample standard deviations from psychological and cross level analyses were collected from primary studies as a representation of the variation of cultural values within organizations. The reported standard deviations were then used to compute the coefficient of variation, which reflects the ratio of the standard deviation to the mean (i.e., standard deviation/mean) and is useful when comparing standard deviations from different studies or datasets when means are substantially different (Bedeian & Mossholder, 2000; Berenson, Levine, & Krehbiel, 2004; Rhiel, 2004) (Table 5).

Organization region (West. vs. non-West). Organization country was categorized into West or non-West regions based on previous discussion and classifications of West countries: U.S., U.K., Western Europe, Canada, Australia, and New Zealand (North & Fiske, 2015; United Nations Department of General Assembly and Conference Management, 2012). This distinction was admittedly arbitrary and makes broad generalizations about cultures, but does generally distinguish between countries where English language and/or culture are more prevalent (*The World Factbook*, 2013).

Industry type. Industries were categorized based on the descriptions from each primary study in combination with the North American Industry Classification System (U.S. Census Bureau, 2012). Industries were classified in nine primary domains: aviation, construction, healthcare, manufacturing, mining, oil and gas, shipping, trade,

Table 4

Descriptive Statistics of National-Organizational Cultural Value Difference

Cultural value	*k*	Mean	Standard deviation	Minimum / Maximum
Individualism	7	4.89	0.93	4.13 / 5.88
Power distance	11	5.34	3.29	3.01 / 10.43
Uncertainty avoidance	–	–	–	–
Masculinity	15	5.62	2.24	2.58 / 9.54
Long-term orientation	–	–	–	–

Note. k = total number of independent correlations and associated studies that reported the requisite information to assess national-organizational cultural value difference.

and utilities.

Safety climate operationalization. Given that safety climate is a multidimensional construct, effect sizes were coded separately for the relationships between cultural values and safety climate dimensions provided studies reported this information. These effect sizes were then categorized using Beus and colleagues' (Beus et al., 2010; Beus et al., 2013) safety climate operationalization, who identified seven dimensions based on Zohar's (2003) conceptualization of safety climate and subject-matter expert ratings: (1) management commitment, (2) safety communication, (3) coworker safety practices, (4) safety training, (5) safety involvement, (6) safety rewards, and (7) safety equipment and housekeeping.

There were also a variety of other dimensions measured in previous assessments of cultural values and safety climate. Meta-analytic estimates were computed and reported separately only for dimensions that have been assessed at least twice for each cultural value ($k \geq 10$). This resulted in the inclusion of six additional dimensions: (1)

Table 5

Descriptive Statistics of Organizational Cultural Value Variation

Cultural value	*k*	Mean	Standard deviation	Minimum / Maximum
Individualism	11	0.23	0.09	0.12 / 0.34
Power distance	14	0.39	0.19	0.06 / 0.65
Uncertainty avoidance	6	0.23	0.13	0.09 / 0.39
Masculinity	19	0.28	0.12	0.15 / 0.53
Long-term orientation	7	0.27	0.13	0.10 / 0.39

Note. k = total number of independent correlations and associated studies that reported the requisite information to assess cultural value variation.

conflict between safety and work priorities, (2) espoused safety values, (3) learning culture, (4) management awareness of risk, (5) reporting culture, and (6) safety instructions. There were various other uncategorized dimensions assessed less consistently across cultural values (Table 6). Dimensions that were reflective of lower/less favorable safety climate (e.g., conflict between safety and work priorities, bad practices, blame culture) were reverse coded to reflect higher levels of safety climate.

Table 6

Uncategorized Safety Climate Dimensions

Dimension	***k***
Attitudes to safety rules/instructions	2
Awareness and beliefs	6
Bad practices	1
Blame culture	1
Employee and management's attitude to safety and quality	2
Hindrances towards safety	5
Incident reporting	6
Operational	3
Physical work environment	6
Quality and safety experience	2
Safety reporting	1
Safety supervision	1
Safety support	6
Strategic	3
Supportive environment	6
Total safety commitment and employee involvement	1

Note. k = total number of independent correlations between at least one cultural value and each safety climate dimension.

3. RESULTS

Publication Bias Analyses

Results for the publication bias analyses provided mixed support for the presence of bias. The Begg rank correlations (Begg & Mazumdar, 1994) between sample sizes and effect sizes and between variances and effect sizes were significant (sample size-effect size $Z = -1.98$, $p < .05$; variance-effect size $Z = 2.58$, $p < .05$), which indicated that studies with smaller sample sizes and larger variances had stronger effects. Egger's test of asymmetry (Egger, Smith, Schneider, & Minder, 1997) similarly supported the presence of publication bias; the intercept of the regression line with precision (i.e., the inverse standard error) predicting effect size was significantly different from zero ($t = 2.05$, $p < .05$). However, analyses based on the funnel plot distribution suggested the opposite, that publication bias was not present. The slope of the funnel plot regression was not significantly different from zero ($t = -1.73$, $p > .05$). Likewise, the trim and fill method estimated that less than three studies in the right, left, and both tails of the funnel plot distribution were concealed by publication bias. No adjustment was made for publication bias given the mixed results and general concerns about the appropriateness of current approaches to correct for bias (Schmidt & Hunter, 2011).

Cultural Values and Safety Constructs – Direct Relationships

The primary hypotheses in this study concerned the direct relationships between cultural values and safety constructs. Individualism and long-term orientation were hypothesized as positive correlates of safety constructs, whereas power distance, uncertainty avoidance, and masculinity were expected to be negatively associated with

safety. These hypotheses were tested for a number of safety constructs separated by level of analysis (psychological, cross, and national). The results tables report all findings, even those relationships that have been examined only once. However, the following summary focuses solely on the meta-analytic estimates and for relationships that have been assessed at least three times ($k \geq 3$). Also in the subsequent description of results, correlations are reported in decreasing magnitude.

Psychological-level relationships. Safety climate and behavior have received the most research attention as psychological-level correlates of cultural values; however, previous researchers have also assessed relationships with safety knowledge and motivation (Table 7). Individualism displayed the strongest correlations with safety behavior (ρ = -.15, k = 12), safety knowledge (ρ = -.12, k = 3), and safety compliance (ρ = -.12, k = 6), but these negative relationships were contrary to expectations. Individualism was also minimally associated with safety motivation (ρ = -.05, k = 19) and safety climate (ρ = -.03, k = 20). The relationship between power distance and participation was the only finding consistent with the hypothesized effect (ρ = -.39, k = 4), whereas findings for the relationships between power distance and other safety constructs were mostly at odds with the hypotheses: safety climate (ρ = .19, k = 28), safety behavior (ρ = -.04, k = 16), and safety compliance (ρ = .00, k = 8).

Results for uncertainty avoidance, masculinity, and long-term orientation were more consistent with the hypothesized relationships for these cultural values. Uncertainty avoidance was negatively associated with safety climate (ρ = -.14, k = 21), safety compliance (ρ = -.06, k = 3), and safety behavior (ρ = -.03, k = 7). Masculinity

Table 7

Psychological-Level Results of Cultural Values and Safety Construct Relationships

	k	***N***	***r***	***SD*$_r$**	**ρ**	**95% CI**	***SD*$_\rho$**	**80% CV**
Individualism								
Hazard perceptions	1	254	.13	–	–	–	–	–
Safety-specific leadership	1	292	.15	–	–	–	–	–
Safety climate	20	23,604	-.03	0.13	-.03	[-.09, .03]	0.16	[-.23, .17]
Safety motivation	3	824	-.05	0.28	-.05	[-.37, .27]	0.29	[-.42, .32]
Safety knowledge	3	3,090	-.10	0.11	-.12	[-.27, .03]	0.12	[-.27, .03]
Safety behavior - Composite	12	9,062	-.12	0.16	-.15	[-.26, -.04]	0.20	[-.41, .11]
Compliance	6	7,547	-.10	0.11	-.12	[-.01, -.23]	0.13	[-.29, .05]
Participation	2	532	-.21	0.36	-.24	[-.81, .33]	0.41	[-.76, .28]
Power distance								
Hazard perceptions	1	254	.19	–	–	–	–	–
Safety climate	28	26,150	.13	0.23	.19	[.07, .31]	0.34	[-.25, .63]
Safety knowledge	1	258	.19	–	–	–	–	–
Safety behavior - Composite	16	11,118	-.02	0.17	-.04	[-.21, .13]	0.25	[-.36, .28]
Compliance	8	8,574	.00	0.15	.00	–	0.24	[-.31, .31]
Participation	4	1,561	-.22	0.03	-.39	[-.44, -.34]	0.03	[-.43, -.35]
Uncertainty avoidance								
Hazard perceptions	1	254	.03	–	–	–	–	–
Safety climate	21	22,506	-.10	0.25	-.14	[-.29, .01]	0.33	[-.56, .28]
Safety knowledge	2	2,754	-.14	0.11	-.17	[-.36, .02]	0.13	[-.34, -.00]
Safety behavior - Composite	7	7,162	-.02	0.21	-.03	[-.26, .20]	0.29	[-.40, .34]
Compliance	3	6,179	-.06	0.18	-.08	[-.35, .19]	0.25	[-.35, .19]
Masculinity								
Hazard perceptions	1	254	-.02	–	–	–	–	–
Safety-specific leadership	2	4,154	.03	0.00	.04	[.04, .04]	0.00	[.04, .04]

Table 7 continued

	k	*N*	*r*	SD_r	ρ	95% CI	SD_ρ	80% CV
Masculinity								
Safety climate	22	32,077	-.12	0.17	-.16	[-.25, -.07]	0.22	[-.44, .12]
Safety knowledge	1	2,558	-.14	–	–	–	–	–
Safety behavior - Composite	21	28,255	-.06	0.11	-.08	[-.14, -.02]	0.13	[-.25, .09]
Compliance	12	20,254	-.04	0.10	-.06	[-.14, .02]	0.13	[-.23, .11]
Participation	5	7,018	-.08	0.12	-.11	[-.25, .03]	0.15	[-.30, .08]
Long-term orientation								
Hazard perceptions	1	254	.03	–	–	–	–	–
Safety climate	17	24,166	.22	0.21	.28	[.15, .41]	0.27	[-.07, .63]
Safety knowledge	1	2,558	.21	–	–	–	–	–
Safety behavior - Composite	8	7,851	.09	0.22	.11	[-.08, .30]	0.28	[-.25, .47]
Compliance	4	6,868	.07	0.21	.09	[-.17, .35]	0.27	[-.26, .44]

Note. k = total number of independent correlations; N = total combined sample size; r = sample-weighted correlation; SD_r = standard deviation of the sample-weighted correlation; ρ = sample-weighted correlation corrected for measurement error; 95% CI = 95% confidence interval around the corrected correlation; SD_ρ = standard deviation of the corrected correlation; 80% CV = 80% credibility interval around the corrected correlation.

was similarly negatively associated with safety climate (ρ = -.16, *k* = 22), participation (ρ = -.11, *k* = 5), compliance (ρ = -.08, *k* = 12), and behavior (ρ = -.08, *k* = 21). Long-term orientation had the largest positive relationship with safety climate (ρ = .28, *k* = 17) and was also positively associated with safety behavior (ρ = .11, *k* = 8), including safety compliance (ρ = .09, *k* = 4).

Cross-level relationships. Most cross-level analyses also primarily examined relationships between cultural values and safety climate and behavior (Table 8). There were, however, fewer cross-level studies and some differences between relationships at the psychological and cross levels. At the cross level, individualism displayed a small but negative relationship with safety behavior (ρ = -.09, *k* = 4) and was unrelated to safety climate (ρ = .04, *k* = 19). Power distance was positively associated with safety behavior (ρ = .09, *k* = 3), and the relationship between power distance and safety climate was more supportive of the hypothesized correlation, but small (ρ = -.07, *k* = 19). Masculinity displayed a similar positive relationship with safety behavior (ρ = .06, *k* = 3) and was unrelated to safety climate (ρ = -.01, *k* = 15).

Results for uncertainty avoidance and long-term orientation were more supportive of the hypotheses and generally consistent with findings from the psychological level, especially their relationships with safety climate (uncertainty avoidance: ρ = -.24 [*k* = 22], long-term orientation: ρ = .20 [*k* = 15]). Uncertainty avoidance was also negatively associated with safety behavior (ρ = -.11, *k* = 3), and long-term orientation likewise displayed a small but negative relationship with behavior (ρ = -.08, *k* = 3).

Table 8

Cross-Level Results of Cultural Values and Safety Construct Relationships

	k	*N*	*r*	SD_r	ρ	95% CI	SD_ρ	80% CV
Individualism								
Safety climate	19	62,859	.03	0.22	.04	[-.09, .17]	0.25	[-.28, .36]
Safety knowledge	2	2,907	-.16	0.18	-.17	[-.44, .10]	0.19	[-.41, .07]
Safety behavior - Composite	4	8,022	-.08	0.20	-.09	[-.31, -.13]	0.22	[-.37, .19]
Compliance	2	5,116	-.06	0.25	-.06	[-.41, .29]	0.28	[-.42, .30]
Fatal work injuries	1	5,104	-.05	–	–	–	–	–
Power distance								
Safety climate	19	74,979	-.06	0.23	-.07	[-.19, .05]	0.25	[-.39, .25]
Safety knowledge	2	2,907	.14	0.23	.15	[-.19, .49]	0.24	[-.16, .46]
Safety behavior - Composite	3	6,569	.08	0.19	.09	[-.15, .33]	0.21	[-.18, .36]
Compliance	2	5,116	.10	0.21	.11	[-.21, .43]	0.24	[-.20, .42]
Fatal work injuries	1	5,104	.06	–	–	–	–	–
Uncertainty avoidance								
Safety climate	22	142,147	-.21	0.14	-.24	[-.31, -.17]	0.16	[-.44, -.04]
Safety knowledge	1	2,558	-.20	–	–	–	–	–
Safety behavior - Composite	3	6,569	-.10	0.16	-.11	[-.31, .09]	0.18	[-.34, .12]
Compliance	2	5,116	-.10	0.18	-.11	[.16, -.38]	0.20	[-.37, .15]
Fatal work injuries	1	5,104	.06	–	–	–	–	–
Masculinity								
Safety climate	15	60,359	-.03	0.23	-.04	[-.20, .12]	0.25	[-.36, .28]
Safety knowledge	1	2,558	.22	–	–	–	–	–
Safety behavior - Composite	3	6,569	.05	0.20	.06	[-.21, .33]	0.22	[-.22, .34]
Compliance	2	5,116	.10	0.21	.11	[-.21, .43]	0.23	[-.18, .40]
Fatal work injuries	1	5,104	.02	–	–	–	–	–

Table 8 continued

	k	*N*	*r*	SD_r	ρ	95% CI	SD_ρ	80% CV
Long-term orientation								
Safety climate	15	60,359	.18	0.20	.20	[.09, .31]	0.23	[-.09, .49]
Safety knowledge	1	2,558	-.09	–	–	–	–	–
Safety behavior - Composite	3	6,569	-.07	0.05	-.08	[-.14, -.02]	0.05	[-.12, -.02]
Compliance	2	5,116	-.08	0.06	-.09	[-.18, .00]	0.06	[-.17, -.01]

Note. k = total number of independent correlations; N = total combined sample size; r = sample-weighted correlation; SD_r = standard deviation of the sample-weighted correlation; ρ = sample-weighted correlation corrected for measurement error in safety constructs; 95% CI = 95% confidence interval around the corrected correlation; SD_ρ = standard deviation of the corrected correlation; 80% CV = 80% credibility interval around the corrected correlation.

National-level relationships. Studies at the national level focused primarily on the relationships between cultural values and safety outcomes (i.e., fatal work injuries, incident rates, and man-made disasters); however, there has been some research on the relationships between national cultural values and national-level safety climate and knowledge (Table 9). The relationships between cultural values and safety climate were largely at odds with the expected findings, whereas results for safety outcomes were generally supportive of the hypotheses. Individualism was negatively associated with fatal work injuries (ρ = -.21, k = 18), but unrelated to safety climate (ρ = -.01, k = 4). In comparison, power distance displayed a positive association with safety climate (ρ = .51, k = 4), but was also positively related to fatal work injuries (ρ = .15, k = 14). Only the relationship between uncertainty avoidance and safety climate was consistent with expectations (ρ = -.25, k = 4) and uncertainty avoidance also had a positive relationship with fatalities (ρ = .09, k = 17). Masculinity displayed positive relationships with both safety climate (ρ = .47, k = 4) and fatal work injuries (ρ = .11, k = 5). Finally, long-term orientation was unrelated to safety climate (ρ = -.02, k = 4) and unfortunately there was only one previous analysis of the relationship between long-term orientation and safety outcomes.

Cultural Values and Safety – Moderators

The results of the direct relationships between cultural values and safety constructs were largely indicative of the presence of moderators. Most of the credibility intervals for the corrected correlations, even the strongest relationships, overlapped with zero. Analyses of the proposed moderators were limited to correlations with safety

Table 9

National-Level Results of Cultural Values and Safety Construct Relationships

	k	***N***	***r***	***SD*$_r$**	**95% CI**	**80% CV**
Individualism						
Safety climate	4	40	-.01	0.44	[-.44, .42]	[-.57, .55]
Safety knowledge	2	20	-.32	0.39	[-.86, .22]	[-.82, .18]
Safety behavior - Composite	1	48	.38	–	–	–
Outcomes - Fatal work injuries	18	465	-.21	0.26	[-.33, -.09]	[-.54, .12]
Outcomes - Incident rates	2	25	-.68	0.14	[-.87, -.49]	[-.86, -.50]
Outcomes - Man-made disasters	1	39	-.05	–	–	–
Power distance						
Safety climate	4	40	.51	0.27	[.25, .77]	[.16, .86]
Safety knowledge	2	20	.74	0.11	[.59, .89]	[.60, .88]
Outcomes - Fatal work injuries	15	376	.14	0.19	[.04, .24]	[-.10, .38]
Outcomes - Incident rates	2	25	.51	0.03	[.47, .55]	[.47, .55]
Uncertainty avoidance						
Safety climate	4	40	-.25	0.51	[-.75, .25]	[-.90, .40]
Safety knowledge	2	20	-.04	0.18	[-.29, .21]	[-.27, .19]
Outcomes - Fatal work injuries	17	396	.09	0.11	[.04, .14]	[-.05, .23]
Outcomes - Incident rates	2	25	.59	0.06	[.51, .67]	[.51, .67]
Outcomes - Man-made disasters	1	39	.27	–	–	–
Masculinity						
Safety climate	4	40	.47	0.51	[-.03, .97]	[-.18, 1]
Safety knowledge	2	20	-.09	0.28	[-.48, .30]	[-.45, .27]
Outcomes - Fatal work injuries	5	151	.11	0.11	[.01, .21]	[-.03, .25]
Outcomes - Incident rates	2	25	-.10	0.03	[-.14, -.06]	[-.14, -.06]
Outcomes - Man-made disasters	1	39	.14	–	–	–

Table 9 continued

	k	*N*	*r*	SD_r	95% CI	80% CV
Long-term orientation						
Safety climate	4	40	-.02	0.21	[-.23, .19]	[-.29, .25]
Safety knowledge	2	20	.16	0.45	[-.46, .78]	[-.42, .74]
Outcomes - Fatal work injuries	1	26	.28	–	–	–

Note. k = total number of independent correlations; N = total combined sample size; r = sample-weighted correlation; SD_r = standard deviation of the sample-weighted correlation; 95% CI = 95% confidence interval around the sample-weighted correlation; 80% CV = 80% credibility interval around the sample-size weighted correlation. The correlations were not corrected for measurement error because reliability information was largely not reported at the national level and individual-level reliability information is not appropriate for correcting aggregated effect sizes.

climate and safety behavior at the psychological and cross levels and safety outcomes at the national level (Table 10). These were the only safety constructs that have been assessed for each cultural value and based on at least five effect sizes[4]. The results for psychological- and cross-level analyses were combined to examine proposed moderators of the relationships with safety climate and behavior. Combining these results was admittedly not ideal, but provided more comprehensive estimates as unfortunately not all studies that reported relationships at these levels also reported enough information to test the moderating conditions (see also Taras et al., 2010).

National-organizational cultural value difference. National-organizational cultural value difference was proposed as a moderator of the cultural value-safety relationships such that greater difference was expected to be associated with weaker positive relationships and stronger negative relationships (Table 11). Unfortunately, many studies did not report the requisite information to assess national-organizational value difference, especially for uncertainty avoidance and long-term orientation. Sample weighted correlations are reported in Table 11 for those studies and associated effect sizes that reported enough information compute difference scores. Interpreting the results for these moderator tests involves comparing the standardized regression coefficient (β) to the sample-weighted correlation.

Findings provide some tentative support for the moderating effect of national-organizational cultural value difference, but do not align with the hypotheses, as greater difference was associated with weaker negative relationships. That is, all regression

[4] The only exception was the relationship between long-term orientation and safety outcomes, as this relationship was based on only one effect size.

Table 10

Results of Cultural Values and Safety Construct Relationships Used for Testing Moderators

	k	*N*	*r*	SD_r	ρ	95% CI	SD_ρ	80% CV
Safety climate[a]								
Individualism	39	86,463	.02	0.21	.02	[-.05, .09]	0.23	[-.27, .31]
Power distance	47	101,129	-.01	0.24	-.02	[-.16, .12]	0.27	[-.37, .33]
Uncertainty avoidance	43	164,653	-.20	0.16	-.23	[-.28, -.18]	0.19	[-.47, .01]
Masculinity	37	92,436	-.06	0.22	-.07	[-.15, .01]	0.24	[-.38, .24]
Long-term orientation	32	84,525	.19	0.21	.21	[.13, .29]	0.23	[-.08, .50]
Safety behavior – Composite[a]								
Individualism	16	17,084	-.10	0.18	-.11	[-.21, -.01]	0.20	[-.37, .15]
Power distance	19	17,687	.01	0.18	.02	[-.14, .18]	0.20	[-.24, .28]
Uncertainty avoidance	10	13,731	-.06	0.19	-.06	[-.18, .06]	0.21	[-.33, .21]
Masculinity	24	34,824	-.04	0.14	-.04	[-.10, .02]	0.15	[-.23, .15]
Long-term orientation	11	14,420	.01	0.19	.02	[-.20, .24]	0.21	[-.25, .29]
Safety outcomes (fatal work injuries, incident rates, man-made disasters)[b]								
Individualism	21	529	-.22	0.27	–	–	–	–
Power distance	17	401	.17	0.21	–	–	–	–
Uncertainty avoidance	20	460	.13	0.16	–	–	–	–
Masculinity	8	215	.09	0.11	–	–	–	–
Long-term orientation	1	26	.28	–	–	–	–	–

Note. *k* = total number of independent correlations; *N* = total combined sample size; *r* = sample-weighted correlation; SD_r = standard deviation of the sample-size weighted correlation; ρ = sample-weighted correlation corrected for measurement error in safety climate and behavior; 95% CI = 95% confidence interval around the corrected correlation; SD_ρ = standard deviation of the corrected correlation; 80% CV = 80% credibility interval around the corrected correlation. [a] Psychological- and cross-level results combined. [b] National-level results only.

Table 11

Cultural Values and Safety Constructs – National-Organizational Cultural Value Difference

	k	***r***	**β**	R^2	***F* value**
Individualism					
Safety climate	7	-.05	.26	.07	0.36
Safety behavior	6	-.27	.03	.00	0.00
Power distance					
Safety climate	11	-.24	.48	.23	2.66
Safety behavior	10	-.14	.26	.07	0.57
Uncertainty avoidance	–	–	–	–	–
Masculinity					
Safety climate	11	-.03	.27	.07	0.69
Safety behavior	15	-.06	.08	.01	0.08
Long-term orientation	–	–	–	–	–

Note. k = total number of independent correlations; r = sample-weighted correlation for the studies and associated effect sizes that reported enough information to compute the proposed moderator (i.e., cultural value mean and standard deviation and organization country); β = standardized regression coefficient for cultural value difference from the weighted least squares regression; R^2 = amount of variance in the relationships between the cultural value and safety correlate accounted for by cultural value difference; F value = regression F value from the weighted least squares regression.

coefficients were positive and coupled with negative sample-weighted correlations; greater difference weakened these negative relationships. The largest effects of national-organizational difference were found for the relationships between power distance and safety climate and behavior. In particular, a greater difference in national-organizational power distance was associated with a weaker negative relationship between power distance and safety climate ($\beta = .48$, $r = -.24$, $k = 11$) and behavior ($\beta = .26$, $r = -.14$, $k = 10$), and accounted for 23% and 7%, respectively, of the variance in these effect sizes. Greater value difference was also associated with weaker negative relationships between individualism and safety climate ($\beta = .26$, $r = -.05$, $k = 7$) and masculinity and safety climate ($\beta = .27$, $r = -.03$, $k = 11$), and accounted for 7% of the variance in these relationships. The effect of differences between national and organizational cultural values for other relationships was negligible (individualism-safety behavior [$\beta = .03$, $r = -.27$, $R^2 = .00$, $k = 6$], masculinity-safety behavior [$\beta = .08$, $r = -.06$, $R^2 = .01$, $k = 15$]).

Organizational cultural value variation. Organization cultural value variation (operationalized as the coefficient of variation within each sample for each cultural value) was similarly expected to be associated with weaker positive relationships between cultural values and safety constructs and stronger negative relationships (Table 12). Sample weighted correlations are reported in Table 12 for only the subset of studies and associated effect sizes that reported cultural value means and standard deviations. Interpreting these results again involves comparing the standardized regression coefficient (β) to the sample-weighted correlation. Findings for cultural value variation were more consistent with the hypotheses and especially relationships with power

Table 12

Cultural Values and Safety Constructs – Organization Cultural Value Variation

	k	***r***	**β**	R^2	***F* value**
Individualism					
Safety climate	9	-.05	.46	.21	1.83
Safety behavior	11	-.17	.57	.33	4.39
Power distance					
Safety climate	12	-.19	-.77	.59	14.64*
Safety behavior	14	-.10	-.68	.46	10.25*
Uncertainty avoidance					
Safety climate	5	-.01	-.12	.02	0.05
Safety behavior	6	-.02	.07	.00	0.02
Masculinity					
Safety climate	12	-.04	.31	.09	1.03
Safety behavior	19	-.06	-.21	.05	0.81
Long-term orientation					
Safety climate	8	.17	-.34	.12	0.79
Safety behavior	7	.06	-.52	.27	1.89

Note. k = total number of independent correlations; r = sample-weighted correlation for the studies and associated effect sizes that reported enough information to compute the proposed moderator (i.e., cultural value standard deviation); β = standardized regression coefficient for cultural value variation from the weighted least squares regression; R^2 = amount of variance in the relationships between the cultural value and safety correlate accounted for by cultural value variation; F value = regression F value from the weighted least squares regression.

distance and long-term orientation. The results also tended to be consistent with the previous moderator; that is, greater variation was typically associated with weaker relationships, particularly for individualism and long-term orientation.

In support of the hypotheses, greater cultural value variation was associated with a stronger negative relationship between power distance and safety climate (β = -.77, r = -.19, k = 12) and behavior (β = -.68, r = -.10, k = 14), and accounted for substantial variance in these relationships (R^2 = .59, R^2 = .46, respectively). More variability in cultural values within a given sample was also associated with a weaker positive relationship between long-term orientation and safety climate (β = -.34, r = .17, k = 8) and behavior (β = -.52, r = .06, k = 7), and accounted for 12% and 27% of the variance in these correlations.

Results for individualism and masculinity supported the moderating effect of organizational cultural value variation; however, greater variation was associated with a weaker negative relationship between individualism and safety climate (β = .46, r = -.05, k = 9) and safety behavior (β = .57, r = -.17, k = 11), and variation accounted for 21% and 33% of the variance, respectively, in these relationships. Results for masculinity were mixed, as greater cultural value variation was associated with a weaker negative relationship between masculinity and safety climate (β = .31; r = -.04, k = 12), but greater variation was also associated with a stronger negative relationship between masculinity and safety behavior (β = -.21, r = -.06, k = 19). Cultural value variation accounted for 9% and 5% of the variance in the relationships between masculinity and safety climate and behavior. Findings for uncertainty avoidance were not supportive of

the moderating effect of cultural value variation (uncertainty avoidance and safety climate [$\beta = -.12$, $r = -.01$, $R^2 = .02$, $k = 5$] and behavior [$\beta = .07$, $r = -.02$, $R^2 = .00$, $k = 6$]).

Organization region (West vs. non-West). Given the somewhat limited number of studies that reported the requisite information to examine cultural value difference, organization region was tested as a complementary moderator. Similar to the argument for cultural value fit, correlations between cultural values and safety within an organization might align with broader national culture values. For instance, power distance might be positively associated with safety climate and behavior in organizations that are located in countries that are higher on power distance. To examine this moderator, organization country was categorized into West or non-West regions (West countries: U.S., U.K., Western Europe, Canada, Australia, and New Zealand [North & Fiske, 2015; United Nations Department of General Assembly and Conference Management, 2012]).

The extent to which relationships differed based on where the data were collected (West vs. non-West organization region) was examined for relationships between cultural values and safety climate and behavior[5] (Table 13 and Table 14). Results for power distance and individualism in non-West organizations were strong and at odds with the hypotheses as power distance was positively associated with safety climate ($\rho = .36$, $k = 9$), and individualism was negatively associated with safety climate ($\rho = -.32$, k

[5] Organization region was not examined for relationships between national-level cultural values and safety outcomes because most studies of these relationships either did not specify the country or aggregated outcome indices from multiple countries.

Table 13

Cultural Values and Safety Climate – West vs. non-West Organization Region

	k	***N***	***r***	***SD*$_r$**	**ρ**	**95% CI**	***SD*$_\rho$**	**80% CV**
Individualism								
West	28	81,179	.03	0.20	.03	[-.04, .10]	0.22	[-.25, .31]
non-West	8	1,556	-.29	0.38	-.32	[-.61, -.03]	0.41	[-.84, .20]
Power distance								
West	37	97,834	-.02	0.24	-.02	[-.10, .06]	0.26	[-.35, .31]
non-West	9	1,020	.31	0.58	.36	[-.08, .80]	0.66	[-.45, 1]
Uncertainty avoidance								
West	31	161,828	-.20	0.14	-.23	[-.29, -.17]	0.16	[-.43, -.03]
non-West	10	1,280	.57	0.45	.66	[.34, .98]	0.50	[.02, 1]
Masculinity								
West	33	89,981	-.06	0.22	-.07	[-.16, .02]	0.24	[-.38, .24]
non-West	2	180	-.96	0.02	–	–	–	–
Long-term orientation								
West	25	80,132	.19	0.20	.21	[.12, .30]	0.22	[-.07, .49]
non-West	7	3,630	.36	0.35	.41	[.11, .71]	0.39	[-.09, .91]

Note. k = total number of independent correlations; N = total combined sample size; r = sample-weighted correlation; SD_r = standard deviation of the sample-weighted correlation; ρ = sample-weighted correlation corrected for measurement error in safety climate; 95% CI = 95% confidence interval around the corrected correlation; SD_ρ = standard deviation of the corrected correlation; 80% CV = 80% credibility interval around the corrected correlation.

Table 14

Cultural Values and Safety Behavior – West vs. non-West Organization Region

	k	*N*	*r*	SD_r	ρ	95% CI	SD_ρ	80% CV
Individualism								
West	5	10,486	-.07	0.17	-.07	[-.22, .08]	0.19	[-.31, .17]
non-West	7	1,793	-.26	0.30	-.29	[-.54, -.04]	0.32	[-.70, .12]
Power distance								
West	13	13,608	.03	0.19	.03	[-.07, .13]	0.22	[-.25, .31]
non-West	3	729	.14	0.15	.15	[-.03, .33]	0.15	[-.04, .34]
Uncertainty avoidance								
West	5	10,486	-.07	0.18	-.07	[-.23, .09]	0.21	[-.34, .20]
non-West	3	729	.29	0.22	.32	[.05, .59]	0.23	[.03, .61]
Masculinity								
West	18	30,753	-.03	0.14	-.03	[-.09, .03]	0.15	[-.22, .16]
non-West	3	729	-.16	0.05	-.17	[-.23, -.11]	0.05	[-.11, -.23]
Long-term orientation								
West	5	10,486	.00	0.16	.00	–	0.18	–
non-West	4	1,419	.33	0.17	.36	[.18, .54]	0.18	[.13, .59]

Note. *k* = total number of independent correlations; *N* = total combined sample size; *r* = sample-weighted correlation; SD_r = standard deviation of the sample-weighted correlation; ρ = sample-weighted correlation corrected for sampling error and measurement error in safety behavior; 95% CI = 95% confidence interval around the corrected correlation; SD_ρ = standard deviation of the corrected correlation; 80% CV = 80% credibility interval around the corrected correlation.

= 8). Results for organizations in the West were consistent with the results collapsed across regions, such that individualism and power distance were unrelated to safety climate (ρ = .03 [*k* = 28], ρ = -.02 [*k* = 37], respectively). The West vs. non-West distinction appeared to matter most for uncertainty avoidance as uncertainty avoidance was strong and positively associated with safety climate in non-West organizations (ρ = .66, *k* = 10), but this relationship was the opposite for West organizations (ρ = -.23, *k* = 31).

Masculinity displayed a small negative relationship with safety climate in West organizations (ρ = -.07, *k* = 33), but no conclusions can be made about the same relationship for non-West organizations. Finally, long-term orientation was positively associated with safety climate in both West and non-West organizations, but the relationship was stronger in samples from non-West organizations (ρ = .41, *k* = 7) than West organizations (ρ = .21, *k* = 25).

This pattern of findings was strikingly similar for the cultural value-safety behavior relationships (Table 14). Individualism was negatively associated with safety behavior in both regions, but the negative relationship was stronger for non-West organizations (ρ = -.29, *k* = 7) than West organizations (ρ = -.07, *k* = 5). Similarly, power distance was positively associated with safety behavior in non-West organizations (ρ = .15, *k* = 3), but was unrelated to safety behavior in West organizations (ρ = .03, *k* = 13). Results for uncertainty avoidance were more discrepant as uncertainty avoidance was positively associated with safety behavior in non-West organizations (ρ = .32, *k* = 3), but negatively associated with safety behavior in West organizations (ρ = -.07, *k* = 5).

Masculinity in comparison displayed a negative relationship with safety behavior in non-West organizations (ρ = -.17, *k* = 3), but was unrelated to behavior in West organizations (ρ = -.03, *k* = 18). Finally, long-term orientation had a positive relationship with safety behavior in non-West organizations (ρ = .36, *k* = 4), whereas this relationship was nonexistent in West organizations (ρ = .00, *k* = 5).

Industry type. Industry type (i.e., aviation, construction, healthcare, manufacturing, mining, oil and gas, shipping, trade, and utilities) was also examined as a potential moderator of the relationships between cultural values and safety climate, behavior, and outcomes. However, no specific hypotheses were made about the moderating effect of industry type. Results supported this moderating condition as relationships for aviation and oil and gas aligned with the primary hypotheses, whereas correlations for other industries and especially construction and shipping were often small or in the opposite direction.

***Industry type – Cultural values and safety climate*.** Individualism was positively associated with safety climate in aviation (ρ = .19, *k* = 6), whereas the relationship between individualism and safety climate for construction and shipping was negative (ρ = -.18 [*k* = 8] ρ = -.12 [*k* = 19], respectively), and individualism was unrelated to safety climate in the manufacturing industry (ρ = -.04, *k* = 5) (Table 15). The relationship between power distance and safety climate was in the expected direction for oil and gas (ρ = -.30, *k* = 8), but opposite for shipping (ρ = .22, *k* = 19). These discrepancies were similar for relationships in the other industries: aviation (ρ = -.19, *k* = 7), construction (ρ = .10, *k* = 9), and manufacturing (ρ = -.08, *k* = 4).

Table 15

Cultural Values and Safety Climate – Industry Type

	k	*N*	*r*	SD_r	ρ	95% CI	SD_ρ	80% CV
Individualism								
Aviation	6	38,442	.17	0.03	.19	[.16, .22]	0.03	[.15, .23]
Construction	8	2,138	-.16	0.34	-.18	[-.45, .09]	0.38	[-.67, .31]
Healthcare	1	240	-.46	–	–	–	–	–
Manufacturing	5	3,668	-.04	0.03	-.04	[-.07, -.01]	0.03	[-.08, .01]
Shipping	19	41,975	-.10	0.21	-.12	[-.23, -.01]	0.23	[-.41, .17]
Power distance								
Aviation	7	52,015	-.17	0.08	-.19	[-.26, -.12]	0.09	[-.41, -.18]
Construction	9	1,842	.09	0.50	.10	[-.26, .46]	0.57	[-.63, .83]
Manufacturing	4	2,215	-.07	0.04	-.08	[-.12, -.04]	0.04	[-.13, -.03]
Oil and Gas	8	3,082	-.27	0.01	-.30	[-.31, -.29]	0.09	[-.42, -.18]
Shipping	19	41,975	.20	0.20	.22	[.12, .32]	0.23	[-.07, .51]
Uncertainty avoidance								
Aviation	12	120,138	-.23	0.08	-.27	[-.32, -.22]	0.09	[-.39, -.15]
Construction	10	1,280	.57	0.45	.66	[.34, .98]	0.50	[.02, 1]
Manufacturing	4	2,215	-.01	0.02	-.02	[-.06, .02]	0.02	[-.05, .01]
Shipping	16	40,928	-.12	0.23	-.14	[-.27, -.01]	0.26	[-.47, .19]
Mixed industries	1	92	.03	–	–	–	–	–
Masculinity								
Aviation	6	38,442	-.18	0.06	-.20	[-.25, -.15]	0.07	[-.29, -.11]
Construction	3	1,002	-.22	0.35	-.26	[-.73, .21]	0.39	[-.76, .24]
Manufacturing	4	2,215	-.09	0.02	-.10	[-.12, -.08]	0.02	[-.13, -.07]
Oil and Gas	4	1,541	-.26	0.07	-.29	[-.37, -.21]	0.05	[-.35, -.23]
Shipping	16	40,928	.04	0.27	.04	[-.09, .17]	0.31	[-.36, .44]
Mixed industries	4	8,308	.01	0.05	.01	[-.04, .06]	0.04	[-.04, .06]

Table 15 continued

	k	*N*	*r*	SD_r	ρ	95% CI	SD_ρ	80% CV
Long-term orientation								
Aviation	6	38,442	.32	0.08	.35	[.28, .42]	0.09	[.23, .47]
Construction	2	180	.53	0.08	.73	[.58, .88]	0.08	[.63, .83]
Manufacturing	9	5,665	.22	0.32	.25	[.01, .49]	0.36	[-.21, .71]
Shipping	16	40,928	.07	0.20	.08	[-.03, .19]	0.23	[-.21, .37]

Note. *k* = total number of independent correlations; *N* = total combined sample size; *r* = sample-weighted correlation; SD_r = standard deviation of the sample-size weighted correlation; ρ = sample-weighted correlation corrected for measurement error in safety climate; 95% CI = 95% confidence interval around the corrected correlation; SD_ρ = standard deviation of the corrected correlation; 80% CV = 80% credibility interval around the corrected correlation.

Results for the correlation between uncertainty avoidance and safety climate were strongest and at odds with the hypothesized relationship in the construction industry (ρ = .66, *k* = 10). In comparison, uncertainty avoidance was positively related to safety climate in the aviation and shipping industries (ρ = -.27 [*k* = 12], ρ = -.14 [*k* = 16], respectively), and unrelated in the manufacturing industry (ρ = -.02, *k* = 4). The relationship between masculinity and safety climate was similar in most industries as masculinity was negatively associated with safety climate in oil and gas (ρ = -.29, *k* = 4), construction (ρ = -.26, *k* = 3), aviation (ρ = -.20, *k* = 6), and manufacturing (ρ = -.10, *k* = 4) domains. Masculinity, however, was unrelated to safety climate in the shipping industry (ρ = .04, *k* = 16), and for results from mixed industries (ρ = .01, *k* = 4). Finally, findings for long-term orientation were largely consistent across industries as long-term orientation was positively associated with safety climate in aviation and manufacturing (ρ = .35 [*k* = 6], ρ = .25 [*k* = 9], respectively), and also displayed a positive, but smaller relationship in the shipping industry (ρ = .08, *k* = 16).

Industry type – Cultural values and safety behavior. Results for the relationships between cultural values and safety behavior also indicated that there is meaningful variation in these relationships across industries (Table 16). It is important to note first, however, that there were a smaller number of studies for these analyses and unfortunately no studies have assessed these relationships in the aviation industry.

Individualism was negatively associated with safety behavior in manufacturing (ρ = -.13, *k* = 3) and shipping (ρ = -.10, *k* = 6). However, these results were not consistent in the construction industry (ρ = .04, *k* = 3). Power distance was similarly

Table 16

Cultural Values and Safety Behavior – Industry Type

	k	*N*	*r*	SD_r	ρ	95% CI	SD_ρ	80% CV
Individualism								
Construction	3	1,417	.04	0.04	.04	[-.01, .09]	0.04	[-.01, .09]
Healthcare	2	480	-.60	0.01	-.65	[-.67, -.63]	0.01	[-.66, -.64]
Manufacturing	3	3,160	-.12	0.03	-.13	[-.17, -.09]	0.03	[-.17, .09]
Oil and Gas	2	407	-.12	0.01	-.12	[-.13, -.11]	0.01	[-.13, -.11]
Shipping	6	11,620	-.09	0.19	-.10	[-.27, .07]	0.21	[-.37, .17]
Power distance								
Construction	1	831	-.09	–	–	–	–	–
Manufacturing	2	1,707	.00	0.02	.00	–	–	–
Oil and Gas	10	3,529	-.16	0.08	-.19	[-.25, -.13]	0.07	[-.28, -.10]
Shipping	6	11,620	.08	0.18	.09	[-.07, .25]	0.20	[-.17, .35]
Uncertainty avoidance								
Manufacturing	2	1,707	-.07	0.04	-.08	[-.14, -.02]	0.02	[-11, -.05]
Oil and Gas	2	407	.11	0.01	.12	[.10, .14]	0.10	[-.01, .25]
Shipping	6	11,617	-.06	0.20	-.07	[-.26, .12]	0.22	[-.35, .21]
Masculinity								
Construction	1	824	-.09	–	–	–	–	–
Manufacturing	2	1,707	-.12	0.04	-.14	[-.20, -.08]	0.03	[-.18, -.10]
Oil and Gas	6	1,981	-.12	0.08	-.14	[-.21, -.07]	0.06	[-.22, -.06]
Shipping	6	11,619	.01	0.20	.01	[-.15, .17]	0.23	[-.28, .30]
Mixed industries	9	18,693	-.05	0.08	-.05	[-.10, .00]	0.08	[-.15, .05]
Long-term orientation								
Manufacturing	3	2,397	.07	0.18	.08	[-.15, .32]	0.19	[-.16, .32]
Oil and Gas	2	407	.10	0.04	.10	[.04, .16]	0.04	[.05, .15]

Table 16 continued

	k	*N*	*r*	SD_r	ρ	95% CI	SD_ρ	80% CV
Long-term orientation								
Shipping	6	11,616	.00	0.19	.01	–	0.21	–

Note. *k* = total number of independent correlations; *N* = total combined sample size; *r* = sample-weighted correlation; SD_r = standard deviation of the sample-size weighted correlation; ρ = sample-weighted correlation corrected for measurement error in safety behavior; 95% CI = 95% confidence interval around the corrected correlation; SD_ρ = standard deviation of the corrected correlation; 80% CV = 80% credibility interval around the corrected correlation.

negatively associated with safety behavior in the oil and gas industry (ρ = -.19, *k* = 10), but this relationship was positive in shipping (ρ = .09, *k* = 6). The relationship between uncertainty avoidance and safety behavior was small but negative in shipping (ρ = -.07, *k* = 6), and there were too few results from other industries to draw any conclusions. The relationship between masculinity and safety behavior was in the expected direction for oil and gas (ρ = -.14, *k* = 6), but small in samples from multiple industries (ρ = -.05, *k* = 9) and unrelated in the shipping industry (ρ = .01, *k* = 6). Long-term orientation was also positively related to safety behavior in manufacturing (ρ = .08, *k* = 3), but was unrelated to safety behavior in the shipping industry (ρ = .01, *k* = 6).

***Industry-type – National cultural values and safety outcomes*.** Industry type was also examined as a moderator of the relationships between national-level cultural values and national-level safety outcomes (i.e., fatal work injuries, incident rates, man-made disasters) (Table 17). Unfortunately these analyses were based on even fewer studies and across more industries. However, the pattern of results was largely consistent such that the relationships between cultural values and safety outcomes were strong and in the expected direction for aviation and in samples composed of workers from multiple industries, whereas relationships for other industries were substantially smaller.

Individualism was strong and negatively associated with safety outcomes in samples with mixed industries (ρ = -.43, *k* = 5) and for aviation (ρ = -.68, *k* = 2), but the latter was based on limited effect sizes. Individualism in comparison was unrelated to safety outcomes in the mining (ρ = -.03, *k* = 5), manufacturing (ρ = -.02, *k* = 3), and construction (ρ = -.01, *k* = 6) industries. Power distance was positively associated with

Table 17

Cultural Values and Safety Outcomes – Industry Type

	k	***N***	***r***	***SD*$_r$**	**95% CI**	**80% CV**
Individualism						
Aviation	2	25	-.68	0.14	[-.87, -.49]	[-.86, -.50]
Construction	3	71	-.01	0.01	[-.02, .00]	[-.02, .00]
Manufacturing	3	71	-.02	0.01	[-.03, -.01]	[-.03, -.01]
Mining	5	94	-.03	0.02	[-.05, -.01]	[-.06, .00]
Transportation (unspecified)	1	21	-.06	–	–	–
Trade	1	15	-.06	–	–	–
Utilities	1	21	.00	–	–	–
Mixed industries	5	211	-.43	0.24	[-.64, -.22]	[-.74, -.12]
Power distance						
Aviation	2	25	.51	0.03	[.47, .55]	[.47, .55]
Construction	3	71	.00	0.00	[.00, .00]	[.00, .00]
Manufacturing	3	71	.03	0.01	[.02, .04]	[.02, .04]
Mining	3	59	.02	0.02	[.00, .04]	[-.01, .05]
Transportation (unspecified)	1	21	.08	–	–	–
Trade	1	17	.00	–	–	–
Utilities	1	21	.01	–	–	–
Mixed industries	3	116	.42	0.11	[.30, .54]	[.28, .56]
Uncertainty avoidance						
Aviation	2	25	.59	0.06	[.51, .67]	[.51, .67]
Manufacturing	3	71	.08	0.00	[.08, .08]	[.08, .08]
Mining	3	58	.05	0.03	[.02, .08]	[.01, .09]
Transportation (unspecified)	2	42	.02	0.02	[-.01, .05]	[-.01, .05]
Trade	5	79	.02	0.01	[.01, .03]	[.01, .03]
Mixed industries	5	185	.19	0.14	[.07, .31]	[.01, .37]

Table 17 continued

	k	*N*	*r*	SD_r	95% CI	80% CV
Masculinity						
Aviation	1	25	-.10	0.03	[-.04, -.16]	[-.14, -.06]
Utilities	2	35	-.06	0.00	[-.06, -.06]	[-.06, -.06]
Mixed industries	4	155	.15	0.05	[.10, .20]	[.09. .21]
Long-term orientation						
Mixed industries	1	26	.28	–	–	–

Note. *k* = total number of independent correlations; *N* = total combined sample size; *r* = sample-weighted correlation; SD_r = standard deviation of the sample-weighted correlation; 95% CI = 95% confidence interval around the sample-weighted correlation; 80% CV = 80% credibility interval around the sample-weighted correlation.

safety outcomes in the aviation industry, which was again unfortunately based on small *k*s (ρ = .51, *k* = 2), and in samples from mixed industries (ρ = .42, *k* = 3). The relationships between power distance and safety outcomes were substantially weaker for manufacturing (ρ = .03, *k* = 3), mining (ρ = .02, *k* = 3), and construction (ρ = .00, *k* = 3). Findings were similar for the relationships between uncertainty avoidance and safety outcomes in the aviation (ρ = .59, *k* = 2), mixed (ρ = .19, *k* = 5), manufacturing (ρ = .08, *k* = 3), mining (ρ = .05, *k* = 3), and trade (ρ = .02, *k* = 5) domains. Masculinity was positively associated with safety outcomes in samples from mixed/multiple industries (ρ = .15, *k* = 5) and there were too few studies of other industries to make any definitive conclusions. The one previous analysis of the relationship between long-term orientation and safety outcomes was based on multiple industries.

Safety climate operationalization. As noted earlier, numerous measures of safety climate appear in the literature and whereas there is little debate that safety climate is a multidimensional construct, there is no agreed upon number of safety climate dimensions (e.g., Krispin, 1997; Neal & Griffin, 2006). A related concern is thus the degree to which the observed relationships between cultural values and safety climate vary as a function of the measure used to assess safety climate and associated dimension structure. Starting with Zohar's (2003) conceptualization, Beus and colleagues (Beus et al., 2010; Beus et al., 2013) identified seven safety climate dimensions, which served as the primary operationalization in the current study: management commitment, safety communication, coworker safety practices, safety training, safety involvement, safety rewards, and safety equipment and housekeeping.

Additional safety climate dimensions were examined separately if they have been assessed at least twice for each cultural value: conflict between safety and work priorities[6], espoused safety values, learning culture, management awareness of risk, reporting culture, and safety instructions. Relationships with other dimensions assessed less frequently across cultural values were combined and described as other/uncategorized (e.g., awareness and beliefs, hindrances towards safety, incident reporting, safety support).

Findings provided some support for the moderating effect of safety climate operationalization, as cultural values were not consistently related to all dimensions (Tables 18-22). These differences were most notable for individualism and power distance. Surprisingly, cultural values also displayed the strongest relationships with uncategorized dimensions, and these relationships were consistent with the primary hypotheses. Specifically, individualism was most strongly and positively related to uncategorized dimensions (ρ = .20, k = 10), and displayed a smaller positive relationship with safety communication (ρ = .06, k = 3) and minimal relationship with management commitment (ρ = -.04, k = 8). Results for the other dimensions were too few to permit any conclusions, but the relationships were all negative. The strongest relationship for power distance was with uncategorized dimensions (ρ = -.30, k = 12), and power distance was also negatively related to coworker safety practices (ρ = -.23, k = 6) and safety communication (ρ = -.07, k = 3). Power distance also displayed a positive

[6]As noted previously, this dimension was coded such that higher values reflect less conflict between priorities, thus a more favorable safety climate.

Table 18

Safety Climate Operationalization – Individualism

Dimensions	***k***	***N***	***r***	SD_r	**ρ**	**95% CI**	SD_ρ	**80% CV**
Primary operationalization								
Management commitment	8	15,797	-.04	0.24	-.04	[-.21, .13]	0.26	[-.37, .29]
Coworker safety practices	2	6,661	.13	0.01	.14	[.13, .15]	0.01	[.13, .15]
Safety communication	3	11,523	.05	0.13	.06	[-.12, .24]	0.15	[-.13, .25]
Safety involvement	1	6,407	.19	–	–	–	–	–
Additional dimensions								
Conflict safety/work priorities	2	5,116	-.05	0.11	-.05	[-.20, .10]	0.12	[-.20, .10]
Espoused safety values	2	5,116	-.01	0.02	-.01	[-.04, .02]	0.00	[-.01, -.01]
Learning culture	2	5,116	-.17	0.16	-.19	[-.44, .06]	0.17	[-.41, .03]
Management awareness of risk	2	5,116	-.11	0.09	-.13	[-.28, .02]	0.11	[-.27, .01]
Reporting culture	2	5,116	-.21	0.21	-.24	[-.57, .09]	0.23	[-.53, .05]
Safety instructions	2	5,116	-.06	0.06	-.06	[-.14, .02]	0.06	[-.14, .02]
Other (uncategorized)	10	14,959	.18	0.19	.20	[.07, .33]	0.21	[-.07, .47]

Note. k = total number of independent correlations; N = total combined sample size; r = sample-weighted correlation; SD_r = standard deviation of the sample-weighted correlation; ρ = sample-weighted correlation corrected for sampling error and measurement error in safety climate; 95% CI = 95% confidence interval around the corrected correlation; SD_ρ = standard deviation of the corrected correlation; 80% CV = 80% credibility interval around the corrected correlation.

Table 19

Safety Climate Operationalization – Power Distance

Dimensions	***k***	***N***	***r***	SD_r	**ρ**	**95% CI**	SD_ρ	**80% CV**
Primary operationalization								
Management commitment	10	15,593	.05	0.32	.06	[-.18, .30]	0.34	[-.38, .50]
Coworker safety practices	6	8,202	-.21	0.05	-.23	[-.27, -.19]	0.05	[-.29, -.17]
Safety communication	3	11,523	-.06	0.17	-.07	[-.29, .15]	0.20	[-.33, .19]
Safety involvement	1	6,407	-.17	–	–	–	–	–
Additional dimensions								
Conflict safety/work priorities	2	5,116	.19	0.02	.21	[.18, .24]	0.02	[.18, .24]
Espoused safety values	2	5,116	-.04	0.05	-.04	[-.11, .03]	0.05	[-.10, .02]
Learning culture	2	5,116	.30	0.04	.34	[.28, .40]	0.03	[.30, .38]
Management awareness of risk	2	5,116	.18	0.03	.22	[.17, .27]	0.03	[.18, .26]
Reporting culture	2	5,116	.37	0.06	.42	[.33, .51]	0.07	[.33, .51]
Safety instructions	2	5,116	.03	0.02	.03	[.00, .06]	0.02	[.00, .06]
Other (uncategorized)	12	14,955	-.26	0.20	-.30	[-.43, -.17]	0.22	[-.58, -.02]

Note. k = total number of independent correlations; N = total combined sample size; r = sample-weighted correlation; SD_r = standard deviation of the sample-weighted correlation; ρ = sample-weighted correlation corrected for sampling error and measurement error in safety climate; 95% CI = 95% confidence interval around the corrected correlation; SD_ρ = standard deviation of the corrected correlation; 80% CV = 80% credibility interval around the corrected correlation.

Table 20

Safety Climate Operationalization – Uncertainty Avoidance

Dimensions	***k***	***N***	***r***	***SD*$_r$**	**ρ**	**95% CI**	***SD*$_\rho$**	**80% CV**
Primary operationalization								
Management commitment	6	26,846	-.14	0.25	-.15	[-.36, .06]	0.26	[-.48, .18]
Coworker safety practices	3	20,277	-.17	0.07	-.20	[-.29, -.11]	0.07	[-.29, -.11]
Safety communication	4	25,139	-.21	0.09	-.24	[-.34, -.14]	0.10	[-.37, -.11]
Safety involvement	2	20,023	-.26	0.05	-.33	[-.42, -.24]	0.05	[-.39, -.27]
Additional dimensions								
Conflict safety/work priorities	2	5,116	-.12	0.06	-.14	[-.24, -.04]	0.06	[-.22, -.06]
Espoused safety values	2	5,116	-.05	0.05	-.05	[-.12, .02]	0.04	[-.10, .00]
Learning culture	2	5,116	-.29	0.05	-.33	[-.41, -.25]	0.05	[-.39, -.27]
Management awareness of risk	2	5,116	-.18	0.02	-.22	[-.25, -.19]	0.01	[-.23, -.21]
Reporting culture	2	5,116	-.36	0.05	-.41	[-.49, -.33]	0.05	[-.47, -.35]
Safety instructions	2	5,116	.00	0.02	.00	–	0.00	–
Other (uncategorized)	13	41,400	-.24	0.18	-.28	[-.39, -.17]	0.20	[-.54, -.02]

Note. k = total number of independent correlations; N = total combined sample size; r = sample-weighted correlation; SD_r = standard deviation of the sample-weighted correlation; ρ = sample-weighted correlation corrected for sampling error and measurement error in safety climate; 95% CI = 95% confidence interval around the corrected correlation; SD_ρ = standard deviation of the corrected correlation; 80% CV = 80% credibility interval around the corrected correlation.

Table 21

Safety Climate Operationalization – Masculinity

Dimensions	***k***	***N***	***r***	***SD*$_r$**	**ρ**	**95% CI**	***SD*$_\rho$**	**80% CV**
Primary operationalization								
Management commitment	10	18,975	-.04	0.29	-.04	[-.22, .14]	0.31	[-.44, .36]
Coworker safety practices	4	7,433	-.15	0.05	-.17	[-.11, -.23]	0.04	[-.22, -.12]
Safety communication	3	11,523	-.08	0.12	-.09	[-.24, .06]	0.14	[-.27, .09]
Safety involvement	3	10,561	-.12	0.13	-.14	[-.31, .03]	0.14	[-.32, .04]
Additional dimensions								
Conflict safety/work priorities	2	5,116	.04	0.15	.04	[-.17, .25]	0.16	[-.16, .24]
Espoused safety values	2	5,116	-.04	0.05	-.04	[-.11, .03]	0.04	[-.09, .01]
Learning culture	2	5,116	.05	0.30	.05	[-.37, .47]	0.33	[-.37, .47]
Management awareness of risk	2	5,116	.03	0.19	.03	[-.23, .29]	0.22	[-.25, .31]
Reporting culture	2	5,116	.06	0.38	.06	[-.47, .59]	0.42	[-.48, .60]
Safety instructions	2	5,116	.03	0.01	.03	[.02, .04]	0.01	[.02, .04]
Other (uncategorized)	3	13,068	-.21	0.07	-.23	[-.32, -.14]	0.08	[-.33, -.13]

Note. k = total number of independent correlations; N = total combined sample size; r = sample-weighted correlation; SD_r = standard deviation of the sample-weighted correlation; ρ = sample-weighted correlation corrected for sampling error and measurement error in safety climate; 95% CI = 95% confidence interval around the corrected correlation; SD_ρ = standard deviation of the corrected correlation; 80% CV = 80% credibility interval around the corrected correlation.

Table 22

Safety Climate Operationalization – Long-term Orientation

Dimensions	***k***	***N***	***r***	***SD*$_r$**	**ρ**	**95% CI**	***SD*$_\rho$**	**80% CV**
Primary operationalization								
Management commitment	6	13,920	.26	0.26	.28	[.06, .50]	0.27	[-.07, .63]
Coworker safety practices	2	6,661	.13	0.02	.14	[.11, .17]	0.02	[.11, .17]
Safety communication	3	11,523	.19	0.17	.23	[.00, .46]	0.20	[-.03, .49]
Safety involvement	1	6,407	.38	–	–	–	–	–
Additional dimensions								
Conflict safety/work priorities	2	5,116	.09	0.08	.10	[-.02, .22]	0.08	[.00, .20]
Espoused safety values	2	5,116	.01	0.02	.01	[-.02, .04]	0.02	[-.02, .04]
Learning culture	2	5,116	.11	0.20	.13	[-.20, .46]	0.23	[-.16, .42]
Management awareness of risk	2	5,116	.06	0.13	.07	[-.14, .28]	0.15	[-.12, .26]
Reporting culture	2	5,116	.09	0.30	.10	[-.36, .56]	0.33	[-.32, .52]
Safety instructions	2	5,116	-.01	0.01	-.01	[-.02, .00]	0.01	[-.02, .00]
Other (uncategorized)	6	15,138	.32	0.16	.36	[.22, .50]	0.18	[.13, .59]

Note. k = total number of independent correlations; N = total combined sample size; r = sample-weighted correlation; SD_r = standard deviation of the sample-weighted correlation; ρ = sample-weighted correlation corrected for sampling error and measurement error in safety climate; 95% CI = 95% confidence interval around the corrected correlation; SD_ρ = standard deviation of the corrected correlation; 80% CV = 80% credibility interval around the corrected correlation.

relationship with management commitment, but this relationship was small (ρ = .06, *k* = 10). Correlations for the other dimensions were again too few to permit definitive conclusions, but most of the relationships with these dimensions were positive and thus at odds with the expected findings.

The relationships for uncertainty avoidance were understandably more consistent across dimensions and uncertainty avoidance had the strongest negative relationships with safety climate aggregated across uncategorized dimensions (ρ = -.28, *k* = 13), followed by safety communication (ρ = -.20, *k* = 4), and coworker safety practices (ρ = -.20, *k* = 3). Relationships for masculinity were also generally consistent across dimensions, but tended to be smaller in magnitude. Masculinity was negatively related to uncategorized dimensions (ρ = -.23, *k* = 5), coworker safety practices (ρ = -.17, *k* = 4), safety involvement (ρ = -.14, *k* = 3), safety communication (ρ = -.09, *k* = 3), and management commitment (ρ = -.04, *k* = 10). Finally, long-term orientation was also generally consistent across dimensions and positively related to uncategorized dimensions (ρ = .36, *k* = 8), management commitment (ρ = .28, *k* = 6), and safety communication (ρ = .23, *k* = 3).

4. CONCLUSIONS

The primary aims of this study were to theoretically connect and empirically assess the influence of national culture on workplace safety. Culture is a broad construct that is reflected in a wide variety of practices, symbols, artifacts, and values (see Gelfand, Ayean, Erez, & Leung, 2017). Assessments of culture in psychology overwhelmingly rely on cultural values and on Hofstede's (1980, 1991) cultural value framework most of all: individualism, power distance, uncertainty avoidance, masculinity, and long-term orientation. This study likewise relied on Hofstede's framework despite concerns about his value structure, including its breadth (House et al., 2004) and the degree to which it is an accurate reflection of culture (Adams & Markus, 2001). Hofstede's values nonetheless provide meaningful information about culture in a concise framework that continues to be extensively used in organizational research and applied across levels of analysis (Taras et al., 2010; Tsui et al., 2007).

Workplace safety researchers have to date generally ignored the influence of culture on safety constructs and in extant safety frameworks. Hofmann, Burke, and Zohar (2017) recently acknowledged this oversight in a 100 year review of occupational safety research: "As a whole, improvements could be made in research directed at understanding the processes by which national cultural characteristics affect workplace safety, and within a more complete multilevel perspective" (p. 382). Further, there is evidence that culture contributes to serious workplace incidents and fatalities (Hodgson et al., 2013; Jing et al., 2001; Lu et al., 2016). The current study aimed to acknowledge and estimate the influence of national culture on workplace safety by (1) presenting

theoretical rationale for the effect of Hofstede's cultural values on safety constructs, and (2) empirically examining the relationships between cultural values and safety and conceptually relevant moderators using a systematic integration of previous findings.

The hypothesized relationships between cultural values and safety and proposed moderators were integrated in a multilevel cross-cultural workplace safety framework, which was examined using a meta-analytic approach aggregating results from 30 studies (see Table 16 for a summary of the findings). Various safety constructs have been assessed in the safety literature and included in the cross-cultural safety framework: safety-specific situational factors (hazard perceptions, safety-specific leadership, safety climate), individual safety-related states (safety motivation, safety knowledge), safety behavior (composite, compliance, participation) and outcomes (fatal work injuries, incident rates, man-made disasters). However, only some aspects of the framework could be tested in the current study given previous research (see Figure 4). Specifically, most of the 30 studies focused on the relationships between cultural values and safety climate, knowledge, behavior, and outcomes.

Results in the current study provided some support for the multilevel cross-cultural safety framework; however, most of the direct relationships between cultural values and safety constructs were small in magnitude and coupled with credibility intervals that overlapped with zero. The results were nonetheless generally consistent with previous qualitative reviews (e.g., Kirman et al., 2006; Taras et al., 2009) and Taras et al. (2010) who found that Hofstede's cultural values were most strongly related to

Table 23

Summary of Findings

Hypotheses/Research Questions		**Support?**	**Findings**
1 – 3	Cultural values most strongly associated with safety-specific situational factors, then individual safety-related states, safety behavior, and outcomes	Partially supported	Cultural values most strongly related to safety climate and safety outcomes compared to safety behavior
4	Correlations among cultural values vary for psychological, organizational/group, and national level relationships	Partially supported	Uncertainty avoidance most consistent across levels; power distance least consistent across levels
5 – 6	Individualism positively related to safety perceptions and behavior, negatively related to risks and hazards and outcomes	Not supported	Unrelated to safety climate and negatively related to most other safety constructs
7 – 8	Power distance negatively related to safety perceptions and behavior, positively related to risk and hazards and outcomes	Not supported	Unrelated/positively related to safety climate and behavior
9 – 10	Uncertainty avoidance negatively related to safety perceptions and behavior, positively related to risk and hazards and outcomes	Partially supported	Negatively related to safety climate and behavior and positively related to outcomes
11 – 12	Masculinity negatively related to safety perceptions and behavior, positively related to risk and hazards and outcomes	Partially supported	Negatively related to safety climate and behavior and positively related to outcomes; not consistent/small across levels

Table 23 continued

Hypotheses/Research Questions		Support?	Findings
13 – 14	Long-term orientation positively related to safety perceptions and behavior, negatively related to risks and hazards and outcomes	Partially supported	Positively related to safety climate and behavior
15	National-organizational cultural value difference weaken positive relationships and strengthen negative relationships	Not supported	Weakened negative relationships
16	Cultural value variation weaken positive relationships and strengthen negative relationships	Partially supported	Strengthened negative relationships (power distance); weakened positive relationships (long-term orientation); weakened negative relationships (individualism)
RQ1	Do cultural value-safety relationships vary across industries?	–	Yes – Aviation and oil and gas consistent with hypotheses; construction and shipping, opposite
Additional moderators			**Findings**
1	Do cultural value-safety relationships differ across West vs. non-West organization regions?	–	Yes – Relationships for West organizations reflected direct relationships; relationships for non-West organizations were typically stronger and opposite
2	Do cultural values relate differently to safety climate dimensions?	–	Yes – Relationships for individualism and power distance least consistent across dimensions; strongest relationships with uncategorized dimensions

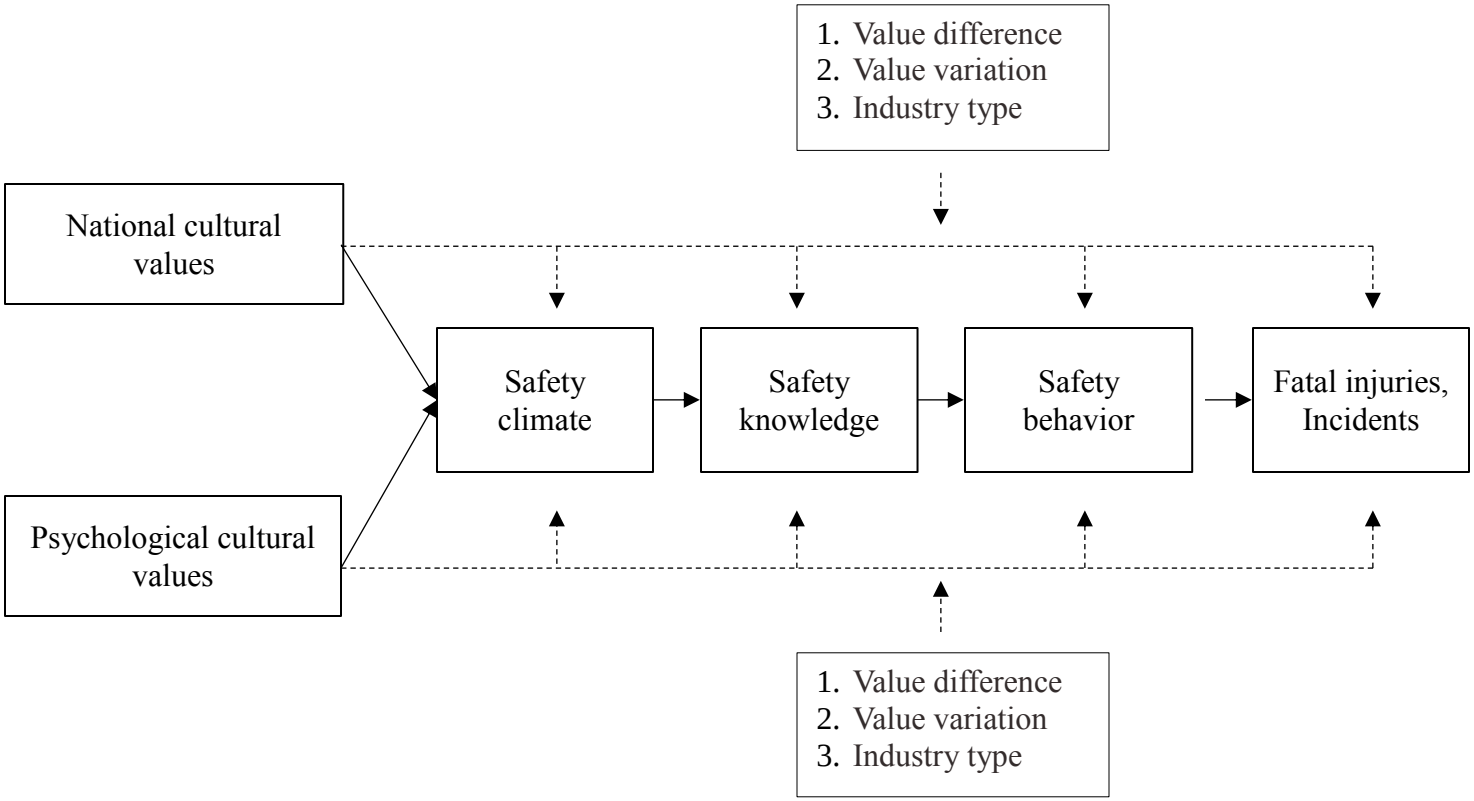

Figure 4. Aspects of the multilevel cross-cultural safety framework examined in the current study.

attitudes (ρ = .20), followed by behaviors (ρ = .15), and performance (ρ = .03). Likewise in this study, Hofstede's cultural values tended to be most strongly related to safety climate (a perceptual construct) and safety knowledge, compared to safety behavior and outcomes. These results are understandable in connection to the cross-cultural safety framework, which proposed that cultural values are distal indicators of safety behavior and outcomes and thus not expected to have strong relationships with these constructs.

The primary hypotheses proposed that each cultural value would have a clear and consistent relationship with safety constructs across levels of analysis (psychological, cross, and national)[7] and that only the size of the relationships would vary across levels; however, the results reflect the complexity of the influence of culture on safety as the direct relationships were more nuanced than initially anticipated. Uncertainty avoidance, long-term orientation, and (to a lesser extent) masculinity were the most consistent correlates of safety climate, knowledge, behavior, and outcomes across levels of analysis, whereas the results for individualism and power distance were less consistent. Uncertainty avoidance was negatively related to safety climate at the individual, cross, and national levels and was likewise negatively related to safety knowledge and behavior across levels (albeit these relationships were small). Uncertainty avoidance was also positively associated with safety outcomes at the national level. Long-term orientation was consistently positively related to safety climate across levels, safety knowledge at the national level, and safety behavior at the individual level. Findings for masculinity also tended to be in the expected direction and especially at the individual

[7] Unfortunately only one study examined these relationships at the organization level (Burke et al., 2008) and no studies examined these relationships at the group level.

level as masculinity was negatively associated with safety climate and behavior, and positively related to safety outcomes at the national level; however, these results were not consistent at the cross level.

Correlations between individualism and power distance and safety constructs were less consistent across levels and those relationships that were consistent were contrary to expectation. Individualism was unrelated to safety climate at the psychological and cross levels, but was negatively related to most other safety constructs (i.e., behavior, compliance, participation, knowledge) except outcomes. There was less support for the hypothesized relationships between power distance and safety climate at the individual and national levels and safety knowledge and behavior at the cross level. The only expected results for power distance were its negative relationship with participation at the individual level and its positive relationship with outcomes at the national level.

The results of the direct relationships between cultural values and safety were largely indicative of moderators and the moderator tests provided a number of meaningful conclusions about the factors that influence these relationships. National-organizational cultural value difference and organization cultural value variation accounted for substantial variance in some of the correlations, and especially individualism and power distance. Specifically, the negative relationships between power distance and safety climate and behavior were strongest when there was less national-organizational difference (i.e., greater congruence) in power distance and more variability in power distance within organizations. The negative relationships between

individualism and safety climate and behavior were strongest when there was less difference between organization and national individualism and when there was less variability in individualism within organizations. Additionally, the positive relationships between long-term orientation and safety climate and behavior were stronger when there was less within-organization cultural value variation. These moderators accounted for little variance in the relationships for other cultural values, namely, uncertainty avoidance and masculinity.

An additional related moderator test found that the relationships between cultural values and safety differed for West vs. non-West organization regions. Relationships based on analyses from West organizations reflected findings for the direct effects, whereas corrected correlations for non-West organizations tended to be larger and often in the opposite direction. This discrepancy was most pronounced for uncertainty avoidance, which displayed positive relationships with safety climate and behavior in West organizations; the same relationships were negative in non-West organizations. These differences were similar for the other cultural values. Specifically, in non-West organizations, individualism and masculinity were negative correlates of safety climate and behavior, and power distance and long-term orientation were positively related to these safety constructs. The same relationships were substantially smaller in West organization samples.

Findings for the moderating effect of industry type were also largely consistent across cultural value-safety relationships. That is, correlations for the aviation and oil and gas industries were supportive of the hypothesized direct relationships, such that

individualism and long-term orientation were positive correlates of safety climate and behavior and negatively related to safety outcomes, whereas the other cultural values (power distance, uncertainty avoidance, and masculinity) were negatively related to safety climate and behavior and positively related to outcomes. The pattern of results for these same relationships tended to be opposite in the construction and shipping industries.

The final analyses examined safety climate measurement by assessing the degree to which cultural values displayed different relationships with safety climate dimensions. The primary operationalization of safety climate was Beus and colleagues' (Beus et al., 2010; Beus et al., 2013) dimension structure and additional dimensions commonly assessed in previous studies of cultural values and safety climate. The negative relationships between uncertainty avoidance and masculinity and safety climate were generally consistent across dimensions, and long-term orientation was likewise positively associated with safety climate for most dimensions. The results for individualism and power distance were less consistent across dimensions. Unexpectedly, relationships between cultural values and uncategorized dimensions (e.g., awareness and beliefs, hindrances towards safety, incident reporting, safety support) were stronger than relationships for other operationalizations and also consistent with the hypothesized direct effects.

Theoretical Implications

An important contribution of this study was to articulate why cultural values are expected to influence safety constructs based on theoretical rationale, which is especially

important for the current state of the literature that lacks breadth and depth of how cultural values are theoretically linked to safety constructs. Indeed, one of the main observations from the literature review was that researchers have done little to advance theoretical explanations for the effect of cultural values on safety that would contribute to future research in this domain.

The current study relied on various theoretical explanations for the influence of cultural values on safety constructs at multiple levels (Erez, 1994, 1997; Erez & Gati, 2004; Locke, 1991; Oyserman et al., 2002b; Oyserman & Uskul, 2008; Schneider, 1987). These theories were used to contend that national and organizational cultural values directly shape the organization policies, practices, and procedures that serve as the basis for safety perceptions and behavior (Aumann & Ostroff, 2006; Kopelman et al., 1990). Individually held cultural values also shape the organizational context through the process of attraction-selection-attrition (Schneider, 1987). Further, cultural values direct employees' attention to particular aspects of the work environment, influencing their interpretations and the motivational impact of the organizational practices they observe (Erez, 1994, 1997; Locke, 1991).

Findings offered some empirical support for this theoretical rationale; however, again many of the direct relationships between cultural values and safety constructs were small in magnitude. Nevertheless, uncertainty avoidance was identified as the strongest and most consistent negative correlate of safety climate and behavior and positive correlate of safety outcomes across levels of analysis. The initial description of uncertainty avoidance suggested a competing rationale for the effect of uncertainty

avoidance on safety. High uncertainty avoidance was expected to lead to compliant safety behavior and the acquisition of safety knowledge, but also reduce open communication, novel ideas about safety, and willingness to report mistakes (Noort et al., 2015). Findings from this study are consistent with those who contend that uncertainty avoidance is especially relevant in the safety domain as a negative influencer of safety (Burke et al., 2008; Hofmann et al., 2017).

Results for long-term orientation and masculinity to a lesser extent also tended to be consistent across levels of analysis. Unfortunately, long-term orientation is often overlooked in assessments of Hofstede's cultural values (see Taras et al., 2012) and likewise there were fewer assessments of the relationships between long-term orientation and safety constructs, compared to other cultural values. Findings, however, supported the conceptual explanation for the positive effect of long-term orientation on safety, and safety climate as a particularly strong correlate. That is, long-term orientation was expected to be associated with flexible and adaptive safety policies, more planning and perseverance to attain long-term safety goals, and greater opportunity to address safety issues ahead of time (Lu et al., 2012; Reader et al., 2015).

The results for masculinity were also mostly supportive of the expected negative relationships between masculinity and safety constructs, especially at the psychological level. Masculinity from a conceptual standpoint undermines communication and trust, and contributes to greater conflict and more propensity for risk taking behavior (Lu et al., 2012; Reader et al., 2015). The small correlations from this meta-analysis, however, are inconsistent with the clear conceptual explanation for the negative effects of

masculinity in the safety domain regardless of moderating effects (e.g., greater conflict, less effective communication).

There was competing conceptual rationale for the effect of individualism on safety and its small relationship with safety climate supported this rationale; however, individualism was negatively related to most other safety constructs and was indeed the strongest negative correlate of safety behavior at the individual level. Individualism was proposed as a positive correlate of safety based on more open and explicit communication; however, individualism was also expected to be associated with less social support and compliant behavior. The results in turn provide some clarity, as it appears individualism primarily undermines safety behavior and leads to fewer positive outcomes at the national level, whereas the relationship between individualism and safety climate depends on moderating effects.

Finally, results for power distance were largely inconsistent across levels of analysis, and the strongest relationships between power distance and safety constructs were opposite of expectations. These findings were surprising given the fairly strong conceptual rationale that power distance undermines open communication and involvement and limits the dissemination of safety knowledge (Lu et al., 2012; Reader et al., 2015; Soeters & Boer, 2000). The positive relationships between power distance and safety (e.g., safety climate at the individual level) gives some credence to previous findings that strict hierarchal organization or team structures are associated with greater coordination and less conflict (e.g., Anderson & Brown, 2010; Ronay, Greenaway, Anicich, & Galinsky, 2012), which might be particularly important in the safety domain.

The primary analyses as a whole, however, suggest that the influence of cultural values on safety constructs depends on moderating factors, which is consistent with recent trends in the broader cross-cultural literature (Gelfand et al., 2017; Kirkman et al., 2006). Tests of the moderating conditions identified two primary considerations, namely, that the relationships between cultural values and safety constructs were: (1) dependent in part on the congruence of cultural values within organizations and with the broader national/regional culture, and (2) stronger and contrasting with the hypothesized effects in regions and industries that have not been extensively studied in the safety domain.

Cultural Value-Safety Moderators

The first two moderators were inspired by the person-environment fit literature and analogous to cultural value fit research, which contends that greater compatibility between employees and their work environment leads to positive outcomes (Aumann & Ostroff, 2006; Dawis & Lofquist, 1984; Kristof-Brown et al., 2005; Newman & Nollen, 1996; Robert et al., 2000). Findings in this study provided mixed support for the hypotheses; however, they were consistent with previous research on organizational climate strength and cultural tightness-looseness as moderators of the relationships between organizational climate and cultural values and pertinent correlates. Less variability in climate perceptions and cultural values consistently strengthens these relationships (Gelfand et al., 2006; Schneider et al., 2017). Likewise, greater congruence (i.e., less difference) in this study consistently strengthened relationships among cultural values and safety, and greater homogeneity within-organizations on cultural values (i.e., less variation) also tended to strengthen cultural-value safety relationships.

West vs. non-West differences. The results of an additional moderator, organization region (i.e., West vs. non-West), provided a corresponding assessment of cultural value congruence/difference and offered additional contributions beyond the first two moderating conditions. Similar to the previous findings and in support of cultural value fit research, the relationships between cultural values and safety were congruent with the broader cultural context. The relationships especially in non-West organizations were consistent with their respective cultural values, as non-West nations/regions tend to be lower on individualism, and higher on power distance, uncertainty avoidance, masculinity, and long-term orientation (Hofstede et al., 2010). The results for non-West organizations tended to reflect these cultural values: individualism was negatively associated with safety climate and behavior, and power distance, uncertainty avoidance, and long-term orientation were positively associated with these safety constructs.

The West vs. non-West differences might be explained by safety regulations and training, which likely differ for organizations in these regions (Ali, 2006; Mearns & Yule, 2009), and in turn influence the effect of cultural values on safety. Organizations in West countries tend to be more strictly regulated and accordingly their employees are commonly provided with frequent and detailed training (Burke & Sockbeson, 2016). Further, some training paradigms that have been developed and used in Western countries are designed to reduce safety issues, such as strict hierarchical structures (e.g., crew resource management training; Salas et al., 2006), that are expected to be associated with particular cultural values (i.e., power distance). These considerations

might explain at least partially why the relationships between cultural values and safety in West organizations were typically small; the quantity and quality of current training paradigms reduce the influence of cultural values on safety.

Another explanation for these results is cultural tightness-looseness in West vs. non-West regions, which suggests that there were stronger relationships between cultural values and safety in non-West organizations because these countries tend to be culturally tighter. As noted previously, cultures characterized as tight exhibit strong social norms and little tolerance for deviant behavior, whereas the norms in looser cultures are less formal and less strictly controlled (Gelfand et al., 2006). Taras et al. (2010) found that cultural tightness moderated the relationships between cultural values and organizational outcomes. The assessment of organization cultural value variability in this study similarly found that less variation typically strengthened relationships between cultural values and safety. Thus, the strong cultural value-safety relationships might be due to in part to greater cultural tightness in non-Western countries (see Gelfand et al., 2011).

Industry type differences. Findings for industry type contribute to further understanding the factors that influence the relationships between cultural values and safety. A consistent finding from these analyses was that the relationships for the aviation and oil and gas industries mirrored the hypothesized direct relationships, whereas results for construction and shipping were often in the opposite direction. These results are understandable in connection to person-environment fit theory and research on cultural value fit, which suggests that particular cultural values might be more

suitable in certain industries (Aumann & Ostroff, 2006; Dawis & Lofquist, 1984; Kristof-Brown et al., 2005; Newman & Nollen, 1996; Robert et al., 2000).

There has indeed been some discussion of how industry characteristics might lead to differences in the effects of cultural values on safety constructs. Håvold (2007) and Lu et al. (2012) described the shipping industry as a "closed social milieu" where crewmembers can only rely on those aboard ship and often do not face unique safety issues. Concern with maintaining group harmony, following strict hierarchical structures, and adhering to stringent safety rules purported to be characterized by less individualism and more power distance and uncertainty avoidance might be most pertinent in the shipping industry (Håvold, 2007; Lu et al., 2012). This rationale appears to be similarly applicable and to some degree more applicable in the construction industry. However, the construction industry is characterized by a more dynamic/uncontrollable working environment, technical complexity, and high supervisor-worker ratio (Ali, 2006; Shen, 2013).

Relationships between cultural values and safety in the aviation and oil and gas industries might also reflect broad industry characteristics. For instance, Soeters and Boer (2000) discussed the importance of open communication and involvement in aviation, and the corresponding positive effects of greater individualism and less power distance. Similarly, Mearns and Yule (2009) argue that low individualism and high power distance and masculinity are particularly influential at undermining safety in the oil and gas industry, which relies on direct communication, participation, and less interpersonal conflict.

Safety climate operationalization. Relationships varied across safety climate dimensions, which align with current understanding of safety climate as a multidimensional construct (Zohar, 2003). These results also provide an indirect assessment of study rigor. Measures of safety climate that overlap with the primary operationalization (Beus et al., 2010; Beus et al., 2013) are arguably less deficient and/or contaminated compared to assessments of other dimensions. Uncertainty avoidance, masculinity, and long-term orientation displayed similar relationships with Beus and colleagues' operationalization, whereas relationships with additional safety climate dimensions (e.g., learning culture, reporting culture) were more variable. These results give some credence to concerns about rigor in previous studies.

Findings for other/uncategorized dimensions, however, are inconsistent with this rationale as cultural values displayed strong relationships with these dimensions, which were in the hypothesized direction. These findings might be explained through an emic understanding of culture. That is, safety climate dimensions that are derived from researchers embedded in specific cultures are better aligned with how safety climate is conceptualized in that culture. Relationships between cultural values and safety climate in turn reflect the primary hypotheses. This contention warrants future research, especially how safety climate is conceptualized across cultures; research on the measurement equivalence of safety constructs provides some support for this rationale (e.g., Xu, 2015).

Practical Implications

The results broadly stress the need for safety research to acknowledge culture and its influence on safety constructs (see also Mearns & Yule, 2009; Strauch, 2010; Starren, Hornikx, & Luijters, 2013). Research in the safety domain commonly ignores the cultural influences of safety, which is a notable oversight considering many organizations in high risk industries function internationally and employ individuals from different cultures (Mearns & Yule, 2009). Uncertainty avoidance was identified as the strongest and most consistent negative correlate of safety perceptions and behavior; thus, safety training might be more pertinent in those nations/regions and organizations characterized by higher uncertainty avoidance. Relatedly, Burke et al.'s (2010) findings indicate that the negative effect of uncertainty avoidance on safety also applies to the transfer of safety training.

Some of the more notable practical applications of this study, however, come from the results of the moderating conditions, rather than the direct relationships. For one, the relationships between cultural values and safety tended to be congruent with the broader national or regional culture, which has implications for the effectiveness of management and organization practices at enhancing safety across cultures. Management practices that are inconsistent with organizational and national cultural values might be ineffective or less effective at reducing safety outcomes and improving behavior. For instance, an organization that encourages involvement from frontline workers in the development and implementation of safety guidelines is likely most effective at enhancing safety in Western countries that are characterized by more

individualism and less power distance; thus, employees expect to be involved in management and organization decisions. These same practices in organizations embedded in more collectivistic and higher power distance cultures, however, might be less effective at improving safety. This seems to be more pertinent for non-West organizations and employees, as the effect of cultural values on safety appears to be most influential in non-West regions.

Relatedly, Robert et al.'s (2000) assessment of culture value fit found that the relationships between empowerment practices (i.e., the extent to which employees are given autonomy and discretion and allowed to participate in decision making) and job satisfaction differed across nations, such that empowerment was positively related to satisfaction in countries higher on individualism and lower on power distance (i.e., U.S. and Poland), but negatively related or unrelated to satisfaction in countries lower on individualism and higher on power distance (i.e., Mexico and India).

These considerations might be particularly relevant in multinational organizations, which are common in high-risk industries (Mearns & Yule, 2009). Organization and management practices that are effective at improving safety in one area and for a particular group of employees are likely not uniformly effective. International organizations are increasingly acknowledging the importance of catering organization practices based on the broader cultural context (Erez, 2011). This also applies at a more micro-level for multinational and multicultural teams that consist of members from different cultures who must work together to maintain safety. Management practices are likely unequally effective for all team members (see also Erez

et al., 2013; Stahl, Maznevski, Voigt, & Jonsen, 2010). The results for cultural value variability provide some support for this contention and might similarly apply to work units and teams. Future research in the safety domain should acknowledge the interactions among employees in multicultural teams and cultural differences and the implications of these interactions and differences for safe practices and behavior (see also Starren et al., 2013).

The underlying rationale for the proposed moderators also applies to the effectiveness of safety training. The current study results provide an indirect critique of safety training paradigms and their effectiveness across cultures. Safety training that is effective for employees from West countries/cultures might be ineffective or less effective at enhancing safety in non-West organizations (Arcury et al., 2010; Burke & Sockbeson, 2016; Samples et al., 2009). This is exasperated by findings that cultural values appear to be most influential in non-West organizations that often have fewer safety regulations and lack sufficient safety training. Indeed, Burke and Sockbeson (2016) acknowledged that future research is needed to develop safety training that accounts for employees' cultural backgrounds.

Limitations and Future Directions

Unfortunately, a primary limitation of this study was the relatively few previous assessments of the relationships between cultural values and safety constructs, which was exacerbated by the substantial number of relationships embedded in the cross-cultural safety framework (see Table 17 for future research directions). The results of the

Table 24

Future Directions/Unanswered Research Questions

Future direction	**Research question**
Cultural values and safety relationships	• How do cultural values at multiple levels relate to risks and hazards, social support, leadership, safety motivation, and safety knowledge? • Are cultural values causally related to safety constructs? What are the causal relationships and how do they interact with other variables in these relationships? • Are other culture values or culture value frameworks more relevant to workplace safety? • When and how do organizational culture and/or safety climate undermine/enhance the effects of cultural values on safety?
Multicultural units/teams	• What are the implications of multinational/multicultural teams on safety? Are there unique difficulties arising from multicultural teams as they relate to safety? • What is the impact of cultural value variability/difference within teams on safety constructs?
Organization/management practices, training, job characteristics	• Are organization/management practices equally effective at enhancing safety across cultures? Which practices are more/less effective and for which cultures? • Are safety training paradigms equally effective at enhancing safety across cultures? Which training paradigms are more/less effective and for which cultures? • Does the effect of culture on safety depend on job characteristics (e.g., interdependence)? • Are employees with certain cultural backgrounds less/more effective at maintaining safety in particular industries/jobs?
Culture and safety	• Are existing safety models consistent across cultures? Are causal relationships distinct in other cultures? • Are some safety constructs conceptualized/understood differently or not at all in some cultures? Are some safety constructs culture-specific? • How are other indicators of culture related to workplace safety? • What are the daily realities of employees in non-West cultures? What are the implications of these daily realities on workplace safety?

direct relationships and conclusions based on the results were constrained mainly to relationships between cultural values and safety climate, knowledge, behavior, and outcomes. Further, the moderating conditions could only be tested for the relationships with safety climate, behavior, and outcomes.

The current study appropriately differentiated between analyses at multiple levels, but in so doing identified additional gaps in the literature. For instance, there was only one analysis at the organization level (Burke et al., 2010) and none at the group level. A focal safety construct in this study was safety climate, but the relationships between cultural values and safety climate were only examined at the individual level. Safety climate is a group level construct that is measured and aggregated based on individual perceptions (Zohar, 1980). Relatedly, the proposed moderators were tested by combining relationships from the psychological and cross levels, which was admittedly not ideal; however, combining the psychological and cross levels afforded for more comprehensive assessments of the moderating conditions because not all studies reported the requisite information to assess these potential moderators.

The multilevel safety framework in combination with theoretical rationale purported that cultural values and safety constructs are casually related. However, this meta-analysis does not speak to the causal relationships between these constructs, but offers simply an indication that cultural values and safety constructs are related. Longitudinal experimental designs are necessary to examine the causal relationships between cultural values and safety constructs.

The results of this meta-analysis nevertheless have meaningful implications for the influence of cultural values in the safety domain and identified various factors that contribute to the effect of cultural values on safety. The direct effect and moderator analyses highlight the importance of future assessments that acknowledge the (1) cultural value, (2) safety construct, and (3) level of analysis, as not all cultural values were consistently related to each safety construct across levels. The results further indicate that future research in the safety domain on cultural influences should take a dynamic and interactive approach (see also Erez, 2011; Gelfand et al., 2017; Kirkman et al., 2006).

Another concern often noted by researchers when examining cultural values at the individual, group, or organization level is ecological fallacy, or the contention that it is erroneous to generalize higher-level phenomenon to lower levels (Hofstede, 1980, 1991). Hofstede (1980, 1991) adamantly opposes using his values survey module (VSM) to measure and make inferences about results at the individual, group, or organization level. However, as noted previously, this argument is at odds with Hofstede's (1980, 1991) original work, which was based on a survey administered to individual employees that contained questions about individual perceptions and behavior. Recent conceptual frameworks also describe culture as existing at multiple levels and thus culture is not solely a national-level phenomenon (e.g., Erez, 1994, 1997; Erez & Gati, 2004; Gelfand et al., 2017; Oyserman et al., 2002b; Oyserman & Uskul, 2008). Empirical evidence by Taras and colleagues (Taras et al., 2009; Taras et al., 2010) and the results of this study also support these claims.

Another potential issue is the degree to which relationships between cultural values and safety were inflated due to common method variance as many of the individual-level relationships were based on self-report measures. It is first important to acknowledge that common method variance is only a concern when there are theoretical and conceptual arguments for a specific method bias affecting measures of both predictors and criteria (Spector, 2006). There are a number of method biases that have been identified in the organizational literature (e.g., consistency motif, social desirability, leniency bias; Podsakoff MacKenzie, & Podsakoff, 2012), but one method bias that might be relevant in self-report measures of safety is social desirability. An argument can be made that employees are motivated to provide overly positive assessments of safety (Keiser & Payne, 2017). However, the small correlations for the direct effect analyses would seem to be at odds with this explanation and there is little reason to believe that method bias accounted for the observed differences in the moderating conditions. Nevertheless, method bias is commonly discounted in safety research and thus future researchers should attempt to better understand the extent to which specific biases conflate relationships. Indeed, some method biases have been found to be more prevalent in specific cultures (e.g., modesty bias in Chinese samples; Farh, Dobbins, & Cheng, 1991; Yu & Murphy, 1993).

Another aspect of cross-cultural assessments is measurement equivalence, or the degree to which measures are interpreted the same across groups of individuals from different cultures (Vandenberg & Lance, 2000). Safety researchers have noted this concern with the application of safety measures in other cultures and languages and there

is some empirical evidence to suggest that safety measures are not equivalent across cultures (Cigularov, Lancaster, Chen, Gittleman, & Haile, 2013; Xu, 2015). Unfortunately, no previous assessment of the relationships between cultural values and safety established the equivalence of their measures. Future research in the safety domain and assessments of cultural value-safety relationships should ensure that measures of safety constructs and/or cultural values are interpreted similarly across pertinent faultlines.

The final limitations concern Hofstede's cultural value framework and cross-cultural research in general. Hofstede's framework is not without its detractors and there are recent and arguably more expansive cultural value frameworks, with the GLOBE project being the most notable example (House et al., 2004). However, as noted previously, seven of the nine cultural values in project GLOBE are conceptually overlapping with Hofstede's original values and the marginal utility of additional cultural values appears to be diminishing over time (Taras et al., 2009). Hofstede's framework was used in the current study despite concerns, because it offers a clear and concise framework for understanding culture as reflected in cultural values that fittingly continues to be extensively used in organizational science.

There is also some recent theoretical and empirical work that reconceptualizes some of Hofstede's original values. For instance, some researchers argue that individualism and collectivism are two distinct constructs, and individualism-collectivism has been further reconceptualized to encompass horizontal and vertical subdimensions (Triandis et al., 1995). Others have similarly split masculinity-femininity

into gender egalitarianism and assertiveness (Aumann et al., 2006). This study maintained consistency with Hofstede's original schema despite these more recent efforts because researchers do not commonly make these distinctions especially in the extant safety literature (for an exception see: Nielson et al., 2015). Future research should, however, acknowledge these distinctions when examining the relationships between cultural values and safety, as they might be especially germane in the context of workplace safety.

A related concern is variability in cultural value measures across studies included in this meta-analysis, which reflect the broader cross-cultural research literature. Understandably, most studies used a version of Hofstede's Values Survey Module (e.g., Hostede, 1980, 1991); however, not all previous assessments used Hofstede's cultural value scales. There are indeed a large number and variety of measures of Hofstede's dimensions and numerous measures of other cultural values in the extant literature (see Taras et al., 2009). Differences in measures of cultural values is a notable concern as the measures researchers use are fundamental to how cultural values are interpreted and affect estimates of their relationships with other constructs. Greater consistency in cultural value measures will reduce the likelihood that measurement is contributing to observed variance (see House et al., 2004).

Another concern with this study and any study of cultural values is the deficiency of the cultural value approach, which continues to be the most common means of assessing culture in psychology. The cultural value approach also offers notable advantages beyond simply comparing groups based on nationality (Taras et al., 2009).

However, culture is a much broader construct that is reflected in an array of symbols, traditions, artifacts, and values (Chao & Moon, 2005). The study of culture is appropriately relevant and studied across myriad disciplines. This study is as an initial foray into the cultural influences of workplace safety that will hopefully inspire greater appreciation of and research attention on culture in the safety domain. Some of the most interesting avenues for future research involve using an emic (i.e., culture specific), rather than etic (i.e., universal truths) understanding and approach to assessing culture. For instance, extant workplace safety models (i.e., Beus et al., 2016; Christian et al., 2009; Nahrgang et al., 2011) and the causal connections therein might exist differently in other cultures. An emic approach might also help identify safety constructs that are culture-specific or identify safety constructs that are conceptualized/understood differently or do not exist at all in specific cultures (e.g., *guanxi* in Japanese culture; Qi, 2013).

Finally, the results of this study provide an indirect critique of the workplace safety literature, which has also been acknowledged in recent reviews of cross-cultural research (e.g., Gelfand et al., 2017). That is, the current understanding of workplace safety at least in English-speaking journals relies heavily on Western thought and focuses on industries that are more Westernized. However, workers around the world face daily realities that are commonly overlooked in pertinent research, including poverty, conflict, terrorism, and corruption (Gelfand et al., 2017). This is especially relevant for employees in less developed countries, which have strikingly high incident and death rates (Ali, 2006; Mohamed et al., 2009). The results of this study in the

context of future research on culture in the safety domain are best summarized by Gelfand et al. (2017):

> In all, we argue that in the next 100 years of research in CCIO/OB [Cross-Cultural Industrial and Organizational Psychology and Organizational Behavior], we need to be mindful that the theories we develop and questions we ask may be laden with Western concerns, and we must strive to ask new questions that reflect other societal values, assumptions, and sociopolitical realities (p. 521).

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APPENDIX A

STUDY HYPOTHESES/RESEARCH QUESTIONS

Table A1

A List of All Study Hypotheses and Research Questions

	Hypothesis
1a.	Psychological cultural values will be more strongly related to safety-specific situational factors (safety climate, leadership, social support, and risk and hazards) and job-specific individual factors (personality characteristics and job attitudes), than individual safety-related states (safety motivation and knowledge).
1b.	Organizational/group cultural values will be more strongly related to safety-specific situational factors (safety climate, leadership, social support, and risk and hazards) and job-specific individual factors (personality characteristics and job attitudes), than individual safety-related states (safety motivation and knowledge).
1c.	National cultural values will be more strongly related to safety-specific situational factors (safety climate, leadership, social support, and risk and hazards) and job-specific individual factors (personality characteristics and job attitudes), than individual safety-related states (safety motivation and knowledge).
2a.	Psychological cultural values will be more strongly related to individual safety-related states (safety motivation and knowledge) than safety behavior (compliance and participation).
2b.	Organizational/group cultural values (averaged across individualism, power distance, uncertainty avoidance, masculinity, and long-term orientation) will be more strongly related to individual safety-related states (safety motivation and knowledge) than safety behavior (compliance and participation).
2c.	National cultural values (averaged across individualism, power distance, uncertainty avoidance, masculinity, and long-term orientation) will be more strongly related to individual safety-related states (safety motivation and

	Hypothesis
	knowledge) than safety behavior (compliance and participation).
3a.	Psychological cultural values will be more strongly related to safety behavior (compliance and participation) than safety outcomes.
3b.	Organizational/group cultural values will be more strongly related to safety behavior (compliance and participation) than safety outcomes.
3c.	National cultural values will be more strongly related to safety behavior (compliance and participation) than safety outcomes.
4.	Effect sizes of the relationships between psychological cultural values, organizational/group cultural values, and national cultural values and safety constructs will differ.
5a.	Psychological individualism will be positively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.
5b.	Organizational/group individualism will be positively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.
5c.	National individualism will be positively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.
6a.	Psychological individualism will be negatively related to (a) risk and hazards, and (b) safety outcomes.
6b.	Organizational/group individualism will be negatively related to (a) risk and hazards, and (b) safety outcomes.
6c.	National individualism will be negatively related to (a) risk and hazards, and (b) safety outcomes.

	Hypothesis
7a.	Psychological power distance will be negatively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.
7b.	Organizational/group power distance will be negatively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.
7c.	National power distance will be negatively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.
8a.	Psychological individualism will be positively related to (a) risk and hazards, and (b) safety outcomes.
8b.	Organizational/group individualism will be positively related to (a) risk and hazards, and (b) safety outcomes.
8c.	National individualism will be positively related to (a) risk and hazards, and (b) safety outcomes.
9a.	Psychological uncertainty avoidance will be negatively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.
9b.	Organizational/group uncertainty avoidance will be negatively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.
9c.	National uncertainty avoidance will be negatively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.
10a.	Psychological uncertainty avoidance will be positively related to (a) risk and hazards, and (b) safety outcomes.
10b.	Organizational/group uncertainty avoidance will be positively related to (a) risk and hazards, and (b) safety outcomes.

	Hypothesis
10c.	National uncertainty avoidance will be positively related to (a) risk and hazards, and (b) safety outcomes.
11a.	Psychological masculinity will be negatively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.
11b.	Organizational/group masculinity will be negatively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.
11c.	National masculinity will be negatively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.
12a.	Psychological masculinity will be positively related to (a) risk and hazards, and (b) safety outcomes.
12b.	Organizational/group masculinity will be positively related to (a) risk and hazards, and (b) safety outcomes.
12c.	National masculinity will be positively related to (a) risk and hazards, and (b) safety outcomes.
13a.	Psychological long-term orientation will be positively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.
13b.	Organizational/group long-term orientation will be positively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.
13c.	National long-term orientation will be positively related to (a) safety climate, (b) safety-related leadership and (c) social support, and (d) safety knowledge, (e) motivation, (f) compliance, and (g) participation.
14a.	Psychological long-term orientation will be negatively related to (a) risk and hazards, and (b) safety outcomes.
14b.	Organizational/group long-term orientation will be negatively related to (a) risk and hazards, and (b) safety

	Hypothesis
	outcomes.
14c.	National long-term orientation will be negatively related to (a) risk and hazards, and (b) safety outcomes.
15a1.	Positive relationships between psychological cultural values and safety constructs will be weaker when there is greater difference between national-organizational cultural values.
15a2.	Positive relationships between organizational/group cultural values and safety constructs will be weaker when there is greater difference between national-organizational cultural values.
15b1.	Negative relationships between psychological cultural values and safety constructs will be stronger when there is greater difference between national-organizational cultural values.
15b2.	Negative relationships between organizational/group cultural values and safety constructs will be stronger when there is greater difference between national-organizational cultural values.
16a1.	Positive relationships between psychological cultural values and safety constructs will be weaker when there is greater within-organization variability in cultural values.
16a2.	Positive relationships between organizational/group cultural values and safety constructs will be weaker when there is greater within-organization variability in cultural values.
16b1.	Negative relationships between psychological cultural values and safety constructs will be stronger when there is greater within-organization variability in cultural values.
16b2.	Negative relationships between organizational/group cultural values and safety constructs will be stronger when there is greater within-organization variability in cultural values.

	Research Question
1a.	Do the relationships between psychological cultural values and safety constructs vary across industries?
1b.	Do the relationships between organizational/group cultural values and safety constructs vary across industries?
1c.	Do the relationships between national cultural values and safety constructs vary across industries?

APPENDIX B

FLOW CHART OF THE LITERATURE SEARCH, ARTICLE REVIEW, AND CODING PROCESS

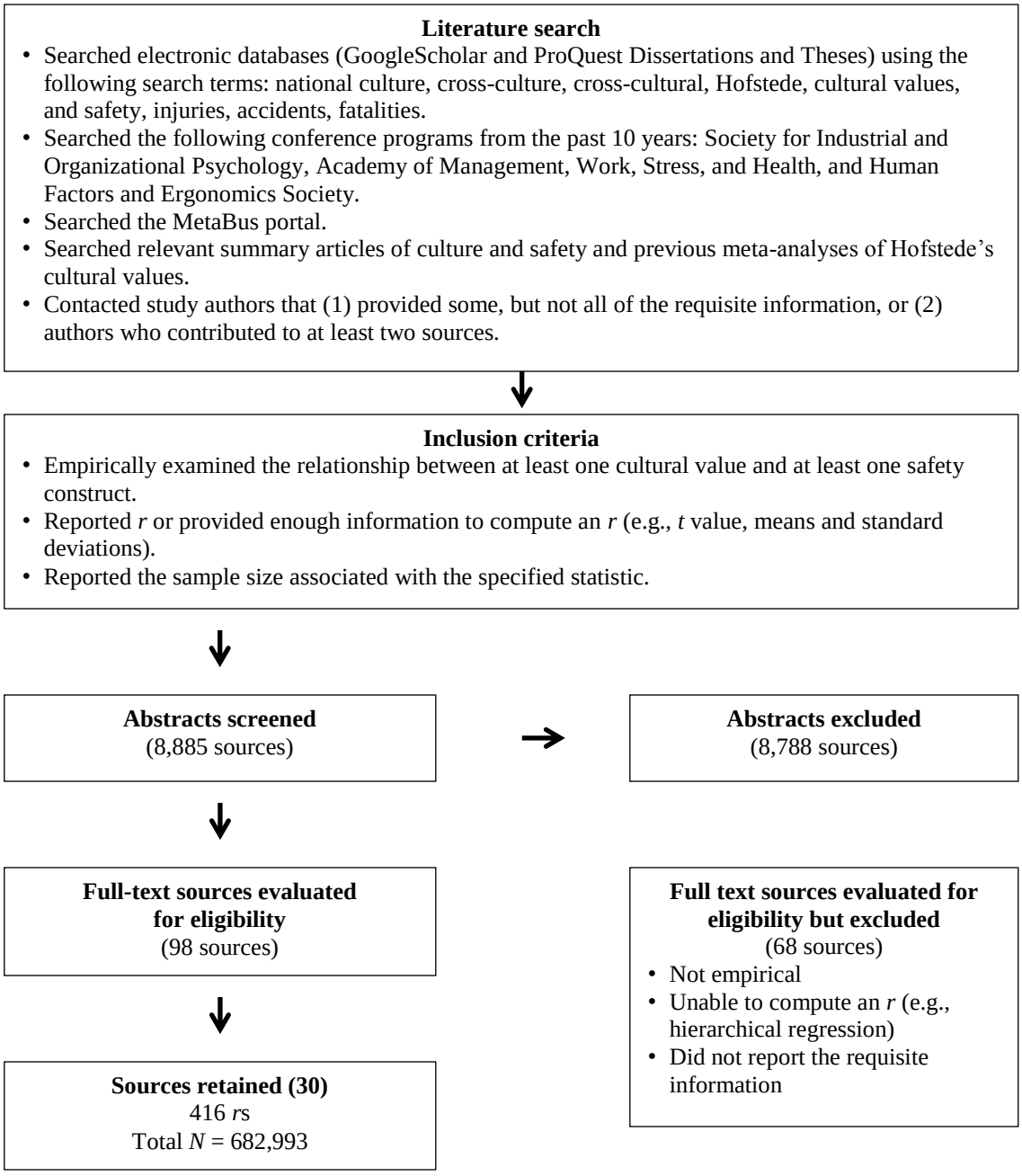

Figure B1. Literature search, article review, and coding process. Adapted from Arthur, Atoba, Keiser, Cho, and Edwards (2017).

APPENDIX C

META-ANALYSIS CODING SHEET

Data point #: _____ [col A]
Coder ID #: _____ [col B]
Authors: _____ [col C]
Publication year: _____ [col D]
Article code: _____ [col E]

Publication type: [col F]
☐ 1. Journal ☐ 2. Dissertation ☐ 3. Thesis ☐ 4. Conference ☐ 5. Chapter

Study context: [col G]
☐ 1. Work ☐ 2. Personal (e.g., driving safety, pedestrian safety) ☐ 3. Laboratory

[8]Industry classification: [col H]
☐ 0. Not specified/unknown
☐ 1. Mixed
☐ 2. Agriculture, Forestry, Fishing, and Hunting
☐ 3. Mining, Quarrying, and Oil and Gas Extraction
☐ 4. Utilities
☐ 5. Construction
☐ 6. Manufacturing
☐ 7. Wholesale Trade
☐ 8. Retail Trade
☐ 9. Transportation and Warehousing
☐ 10. Information
☐ 11. Finance and Insurance
☐ 12. Real Estate and Rental Leasing
☐ 13. Professional, Scientific, and Technical Services
☐ 14. Management of Companies and Enterprises
☐ 15. Waste Management and Remediation Services
☐ 16. Educational Services
☐ 17. Healthcare and Social Assistance
☐ 18. Arts, Entertainment, and Recreation
☐ 19. Accommodation and Food Services
☐ 20. Other Services (except Public Administration)
☐ 21. Public Administration

Industry description: _____ [col I]

Job title: [col J]
☐ 0. Not specified/NA ☐ 1. Mixed ☐ 2. Job title _____ [col K]

Level of analysis: [col L]
☐ 1. Psychological ☐ 2. Group ☐ 3. National ☐ 4. Cross ☐ 5. Organizational

Sample nationality: [col M]
☐ 0. Not specified ☐ 1. Mixed nationalities ☐ 2. Sample nationality _____ [col N]

Organization country: [col O]
☐ 0. Not specified
☐ 1. Organizations from multiple countries

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[8] U.S. Bureau of Labor Statistics (2012). *North American Industry Classification System (NAICS)*. Washington, DC: Government Printing Office. Retrieved from www.bls.gov

☐ 2. Organization country _____ [col P]

Study N: _____ [col Q]

Sex:
☐ Not reported Male: _____ [col R] Female: _____ [col S]

Age:
☐ Not reported Mean_____ [col T] *SD*_____ [col U]

Independent variable: [col V]
☐ 1. Individualism (or Collectivism – reverse code effect size)
☐ 2. Power distance
☐ 3. Uncertainty avoidance
☐ 4. Masculinity (or femininity – reverse code effect size)
☐ 5. Long-term orientation (or short-term orientation – reverse code effect size)
☐ 6. Other cultural value

IV description: _____ [col W]

IV measure: [col X]
☐ 1. Hofstede's original scores (1980)
☐ 2. VSM 82
☐ 3. VSM 94
☐ 4. VSM 08
☐ 5. VSM 2013
☐ 6. Hofstede score mix
☐ 7. GLOBE
☐ 8. Other _____ [col Y]

IV Mean_____ [col Z] **IV *SD***_____ [col AA]

IV level of analysis: [col AB]
☐ 1. Psychological
☐ 2. Group
☐ 3. National
☐ 4. Organizational

r_{xx} (reliability) _____ [col AC]

r_{xx} type: [col AD]
☐ 0. Not reported
☐ 1. Alpha
☐ 2. Split-half
☐ 3. Test-retest
☐ 4. Alternate forms
☐ 5. KR-20

Dependent variable: [col AF]
☐ 1. Risks and hazards
☐ 2. Safety climate/culture
☐ 3. Social support
☐ 4. Leadership
☐ 5. Safety motivation
☐ 6. Safety knowledge
☐ 7. Safety participation
☐ 8. Safety compliance
☐ 9. Safety behavior
☐ 10. Safety outcome (e.g., injuries, fatalities)
☐ 12. Other

Safety climate/culture dimension: [col AG]
☐ 1. Management commitment
☐ 2. Safety communication
☐ 3. Coworker safety practices
☐ 4. Safety training
☐ 5. Safety involvement
☐ 6. Safety rewards
☐ 7. Safety equipment and housekeeping
☐ 8. Other

DV description: _____ [col AH]

DV level of analysis: [col AI]
☐ 1. Psychological
☐ 2. Group
☐ 3. National
☐ 4. Organizational

r_{yy} (reliability) _____ [col AJ]

r_{yy} type: [col AK]
☐ 0. Not reported
☐ 1. Alpha
☐ 2. Split-half
☐ 3. Test-retest
☐ 4. Alternate forms
☐ 5. KR-20
☐ 6. KR-21

☐ 6. KR-21 ☐ 7. Other _____ [col AE]	☐ 7. Other_____ [col AL]

Effect size: _____ [col AM]

Effect size type: [col AN]

☐ 0. Not reported
☐ 1. $r_{\text{Peasrson Product Moment}}$
☐ 2. $r_{\text{Point Biserial}}$
☐ 3. r_{Biserial}
☐ 4. r_{Phi}
☐ 5. $r_{\text{Tetrachoric}}$
☐ 6. Regression
☐ 7. t
☐ 8. F
☐ 9. χ^2
☐ 10. Other: _____ [col AO]

From table #: _____ [col AP]

On page #: _____ [col AQ]

Calculations/Notes: [col AR]

_____

_____

_____

_____

APPENDIX D

META-ANALYSIS EFFECT SIZE TABLE

Table D1

Effect Size Table of Studies Retained in the Meta-analysis

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
Ali (2006)	-.60	130	PSYC	IDV	Collectivism	Safety climate	Strategic	Construction	Pakistan
Ali (2006)	-.82	130	PSYC	IDV	Collectivism	Safety climate	Operational	Construction	Pakistan
Ali (2006)	-.61	140	PSYC	PD	Power distance	Safety climate	Awareness and beliefs	Construction	Pakistan
Ali (2006)	.59	140	PSYC	PD	Power distance	Safety climate	Physical work environment	Construction	Pakistan
Ali (2006)	.56	140	PSYC	PD	Power distance	Safety climate	Supportive environment	Construction	Pakistan
Ali (2006)	.80	140	PSYC	UA	Uncertainty avoidance	Safety climate	Awareness and beliefs	Construction	Pakistan
Ali (2006)	.78	140	PSYC	UA	Uncertainty avoidance	Safety climate	Physical work environment	Construction	Pakistan
Ali (2006)	.52	140	PSYC	UA	Uncertainty avoidance	Safety climate	Supportive environment	Construction	Pakistan
Ali (2006)	-.72	130	PSYC	UA	Uncertainty avoidance	Safety climate	Strategic	Construction	Pakistan
Ali (2006)	.72	130	PSYC	UA	Uncertainty avoidance	Safety climate	Operational	Construction	Pakistan
Alshahrani et al. (2014)	-.13	258	PSYC	IDV	Individualism	Safety behavior	Safety behavior	Petrochemical	Saudi Arabia
Alshahrani et al. (2014)	-.10	149	PSYC	IDV	Individualism	Safety behavior	Safety behavior	Petrochemical	Saudi Arabia
Alshahrani et al. (2014)	-.03	258	CROSS	PD	Power distance	Safety behavior	Safety behavior	Petrochemical	Saudi Arabia
Alshahrani et	.06	149	CROSS	PD	Power distance	Safety	Safety behavior	Petrochemical	Saudi

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
al. (2014)						behavior			Arabia
Alshahrani et al. (2014)	.03	258	PSYC	UA	Uncertainty avoidance	Safety behavior	Safety behavior	Petrochemical	Saudi Arabia
Alshahrani et al. (2014)	.26	149	PSYC	UA	Uncertainty avoidance	Safety behavior	Safety behavior	Petrochemical	Saudi Arabia
Alshahrani et al. (2014)	-.14	258	PSYC	MAS	Masculinity	Safety behavior	Safety behavior	Petrochemical	Saudi Arabia
Alshahrani et al. (2014)	-.07	149	PSYC	MAS	Masculinity	Safety behavior	Safety behavior	Petrochemical	Saudi Arabia
Alshahrani et al. (2014)	.12	258	NATION	LTO	Long term orientation	Safety behavior	Safety behavior	Petrochemical	Saudi Arabia
Alshahrani et al. (2014)	.05	149	PSYC	LTO	Long term orientation	Safety behavior	Safety behavior	Petrochemical	Saudi Arabia
Anicich et al. (2015)	-.05	5104	PSYC	IDV	Individualism	Fatal work injuries	Number of deaths	Mountain climbing	Mixed
Anicich et al. (2015)	.06	5104	PSYC	PD	Power distance	Fatal work injuries	Number of deaths	Mountain climbing	Mixed
Anicich et al. (2015)	.06	5104	NATION	UA	Uncertainty avoidance	Fatal work injuries	Number of deaths	Mountain climbing	Mixed
Anicich et al. (2015)	.02	5104	NATION	MAS	Masculinity	Fatal work injuries	Number of deaths	Mountain climbing	Mixed
Burke et al. (2008)	.03	92	NATION	UA	Uncertainty avoidance	Safety climate	Safety climate	Not reported	Not reported
Håvold (2005)	.67	349	PSYC	IDV	Individualism/ collectivism	Safety climate	Employee and management's attitude to safety and quality	Shipping	Norway
Håvold (2005)	-.19	349	PSYC	IDV	Individualism/ collectivism	Safety climate	Attitudes to safety rules/instructions	Shipping	Norway
Håvold (2005)	.80	349	PSYC	IDV	Individualism/ collectivism	Safety climate	Quality and safety experience	Shipping	Norway
Håvold (2005)	.33	349	PSYC	IDV	Individualism/ collectivism	Safety knowledge	Knowledge	Shipping	Norway
Håvold (2005)	-.84	349	NATION	PD	Power distance	Safety climate	Employee and management's attitude to	Shipping	Norway

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
							safety and quality		
Håvold (2005)	-.12	349	NATION	PD	Power distance	Safety climate	Attitudes to safety rules/instructions	Shipping	Norway
Håvold (2005)	-.69	349	NATION	PD	Power distance	Safety climate	Quality and safety experience	Shipping	Norway
Håvold (2005)	-.48	349	NATION	PD	Power distance	Safety knowledge	Knowledge	Shipping	Norway
Håvold (2007)	.06	2558	CROSS	IDV	Individualism	Safety climate	Management and employee commitment	Shipping	Norway
Håvold (2007)	-.01	2558	CROSS	IDV	Individualism	Safety climate	Espouses safety values	Shipping	Norway
Håvold (2007)	.06	2558	CROSS	IDV	Individualism	Safety climate	Conflict between safety and work priorities	Shipping	Norway
Håvold (2007)	.00	2558	CROSS	IDV	Individualism	Safety climate	Reporting culture	Shipping	Norway
Håvold (2007)	-.02	2558	CROSS	IDV	Individualism	Safety climate	Officers awareness of risk	Shipping	Norway
Håvold (2007)	-.01	2558	CROSS	IDV	Individualism	Safety climate	Learning culture	Shipping	Norway
Håvold (2007)	-.03	2558	CROSS	IDV	Individualism	Safety climate	Safety communication	Shipping	Norway
Håvold (2007)	-.11	2558	CROSS	IDV	Individualism	Safety climate	Perception of safety instructions	Shipping	Norway
Håvold (2007)	.31	10	CROSS	IDV	Individualism	Safety climate	Adverse safety conditions	Shipping	Norway
Håvold (2007)	.87	10	CROSS	IDV	Individualism	Safety climate	Adverse safety conditions at work	Shipping	Norway
Håvold (2007)	.48	10	CROSS	IDV	Individualism	Safety climate	Positive conditions at work	Shipping	Norway
Håvold (2007)	-.32	10	CROSS	IDV	Individualism	Safety climate	Positive conditions at work	Shipping	Norway
Håvold (2007)	.36	10	CROSS	IDV	Individualism	Safety climate	Attitude to safety improvements	Shipping	Norway
Håvold (2007)	-.57	10	PSYC	IDV	Individualism	Safety climate	Attitude to safety improvements	Shipping	Norway
Håvold (2007)	-.57	2558	PSYC	IDV	Individualism	Safety climate	Management and employee commitment	Shipping	Norway

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
Håvold (2007)	.03	2558	PSYC	IDV	Individualism	Safety climate	Espouses safety values	Shipping	Norway
Håvold (2007)	-.15	2558	PSYC	IDV	Individualism	Safety climate	Conflict between safety and work priorities	Shipping	Norway
Håvold (2007)	-.42	2558	PSYC	IDV	Individualism	Safety climate	Reporting culture	Shipping	Norway
Håvold (2007)	-.20	2558	PSYC	IDV	Individualism	Safety climate	Officers awareness of risk	Shipping	Norway
Håvold (2007)	-.32	2558	PSYC	IDV	Individualism	Safety climate	Learning culture	Shipping	Norway
Håvold (2007)	-.14	2558	PSYC	IDV	Individualism	Safety climate	Safety communication	Shipping	Norway
Håvold (2007)	.00	2558	PSYC	IDV	Individualism	Safety climate	Perception of safety instructions	Shipping	Norway
Håvold (2007)	-.08	2558	PSYC	IDV	Individualism	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	.07	10	PSYC	IDV	Individualism	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	-.71	10	PSYC	IDV	Individualism	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	-.23	2558	PSYC	IDV	Individualism	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	-.10	2558	PSYC	IDV	Individualism	Safety compliance	Compliance to rules/safety norms/occupational risk behavior	Shipping	Norway
Håvold (2007)	-.05	2558	PSYC	IDV	Individualism	Safety compliance	Safety behavior (physical)	Shipping	Norway
Håvold (2007)	.19	2558	PSYC	IDV	Individualism	Safety compliance	Compliance to rules/safety norms/occupational risk behavior	Shipping	Norway
Håvold (2007)	-.30	2558	PSYC	IDV	Individualism	Safety compliance	Safety behavior (physical)	Shipping	Norway
Håvold (2007)	.41	2558	CROSS	PD	Power distance	Safety climate	Management and employee commitment	Shipping	Norway
Håvold (2007)	.09	2558	CROSS	PD	Power distance	Safety climate	Espouses safety values	Shipping	Norway

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
Håvold (2007)	.20	2558	CROSS	PD	Power distance	Safety climate	Conflict between safety and work priorities	Shipping	Norway
Håvold (2007)	.31	2558	CROSS	PD	Power distance	Safety climate	Reporting culture	Shipping	Norway
Håvold (2007)	.15	2558	CROSS	PD	Power distance	Safety climate	Officers awareness of risk	Shipping	Norway
Håvold (2007)	.26	2558	CROSS	PD	Power distance	Safety climate	Learning culture	Shipping	Norway
Håvold (2007)	.12	2558	CROSS	PD	Power distance	Safety climate	Safety communication	Shipping	Norway
Håvold (2007)	.04	2558	CROSS	PD	Power distance	Safety climate	Perception of safety instructions	Shipping	Norway
Håvold (2007)	.53	10	NATION	PD	Power distance	Safety climate	Adverse safety conditions at work including fatalism	Shipping	Norway
Håvold (2007)	-.66	10	NATION	PD	Power distance	Safety climate	Adverse safety conditions at work including fatalism	Shipping	Norway
Håvold (2007)	.36	10	NATION	PD	Power distance	Safety climate	Positive conditions at work	Shipping	Norway
Håvold (2007)	.62	10	NATION	PD	Power distance	Safety climate	Positive conditions at work	Shipping	Norway
Håvold (2007)	.16	10	NATION	PD	Power distance	Safety climate	Attitude to safety improvements	Shipping	Norway
Håvold (2007)	.88	10	NATION	PD	Power distance	Safety climate	Attitude to safety improvements	Shipping	Norway
Håvold (2007)	.58	2558	NATION	PD	Power distance	Safety climate	Management and employee commitment	Shipping	Norway
Håvold (2007)	-.01	2558	NATION	PD	Power distance	Safety climate	Espouses safety values	Shipping	Norway
Håvold (2007)	.17	2558	NATION	PD	Power distance	Safety climate	Conflict between safety and work priorities	Shipping	Norway
Håvold (2007)	.43	2558	NATION	PD	Power distance	Safety climate	Reporting culture	Shipping	Norway
Håvold (2007)	.21	2558	NATION	PD	Power distance	Safety climate	Officers awareness of risk	Shipping	Norway
Håvold (2007)	.33	2558	NATION	PD	Power distance	Safety climate	Learning culture	Shipping	Norway
Håvold (2007)	.14	2558	PSYC	PD	Power distance	Safety climate	Safety communication	Shipping	Norway

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
Håvold (2007)	.01	2558	PSYC	PD	Power distance	Safety climate	Perception of safety instructions	Shipping	Norway
Håvold (2007)	.19	2558	PSYC	PD	Power distance	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	.63	10	PSYC	PD	Power distance	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	.84	10	PSYC	PD	Power distance	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	.23	2558	PSYC	PD	Power distance	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	-.03	2558	PSYC	PD	Power distance	Safety compliance	Compliance to rules/safety norms/occupational risk behavior	Shipping	Norway
Håvold (2007)	.22	2558	PSYC	PD	Power distance	Safety compliance	Safety behavior (physical)	Shipping	Norway
Håvold (2007)	-.11	2558	PSYC	PD	Power distance	Safety compliance	Compliance to rules/safety norms/occupational risk behavior	Shipping	Norway
Håvold (2007)	.31	2558	PSYC	PD	Power distance	Safety compliance	Safety behavior (physical)	Shipping	Norway
Håvold (2007)	-.44	2558	CROSS	UA	Uncertainty avoidance	Safety climate	Management and employee commitment	Shipping	Norway
Håvold (2007)	.09	2558	CROSS	UA	Uncertainty avoidance	Safety climate	Espouses safety values	Shipping	Norway
Håvold (2007)	-.06	2558	CROSS	UA	Uncertainty avoidance	Safety climate	Conflict between safety and work priorities	Shipping	Norway
Håvold (2007)	-.31	2558	CROSS	UA	Uncertainty avoidance	Safety climate	Reporting culture	Shipping	Norway
Håvold (2007)	-.16	2558	CROSS	UA	Uncertainty avoidance	Safety climate	Officers awareness of risk	Shipping	Norway
Håvold (2007)	-.24	2558	CROSS	UA	Uncertainty avoidance	Safety climate	Learning culture	Shipping	Norway

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
Håvold (2007)	-.08	2558	NATION	UA	Uncertainty avoidance	Safety climate	Safety communication	Shipping	Norway
Håvold (2007)	.02	2558	NATION	UA	Uncertainty avoidance	Safety climate	Perception of safety instructions	Shipping	Norway
Håvold (2007)	.75	10	PSYC	UA	Uncertainty avoidance	Safety climate	Adverse safety conditions at work including fatalism	Shipping	Norway
Håvold (2007)	-.11	10	PSYC	UA	Uncertainty avoidance	Safety climate	Adverse safety conditions at work including fatalism	Shipping	Norway
Håvold (2007)	.29	10	PSYC	UA	Uncertainty avoidance	Safety climate	Positive conditions at work	Shipping	Norway
Håvold (2007)	-.84	10	PSYC	UA	Uncertainty avoidance	Safety climate	Positive conditions at work	Shipping	Norway
Håvold (2007)	.22	10	PSYC	UA	Uncertainty avoidance	Safety climate	Attitude to safety improvements	Shipping	Norway
Håvold (2007)	-.66	10	PSYC	UA	Uncertainty avoidance	Safety climate	Attitude to safety improvements	Shipping	Norway
Håvold (2007)	.55	2558	PSYC	UA	Uncertainty avoidance	Safety climate	Management and employee commitment	Shipping	Norway
Håvold (2007)	.00	2558	PSYC	UA	Uncertainty avoidance	Safety climate	Espouses safety values	Shipping	Norway
Håvold (2007)	-.18	2558	PSYC	UA	Uncertainty avoidance	Safety climate	Conflict between safety and work priorities	Shipping	Norway
Håvold (2007)	-.40	2558	PSYC	UA	Uncertainty avoidance	Safety climate	Reporting culture	Shipping	Norway
Håvold (2007)	-.20	2558	PSYC	UA	Uncertainty avoidance	Safety climate	Officers awareness of risk	Shipping	Norway
Håvold (2007)	-.34	2558	PSYC	UA	Uncertainty avoidance	Safety climate	Learning culture	Shipping	Norway
Håvold (2007)	-.12	2558	PSYC	UA	Uncertainty avoidance	Safety climate	Safety communication	Shipping	Norway
Håvold (2007)	-.02	2558	PSYC	UA	Uncertainty avoidance	Safety climate	Perception of safety instructions	Shipping	Norway

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
Håvold (2007)	-.17	2558	PSYC	UA	Uncertainty avoidance	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	-.22	10	PSYC	UA	Uncertainty avoidance	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	.14	10	PSYC	UA	Uncertainty avoidance	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	-.20	2558	PSYC	UA	Uncertainty avoidance	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	.15	2558	PSYC	UA	Uncertainty avoidance	Safety compliance	Compliance to rules/safety norms/occupational risk behavior	Shipping	Norway
Håvold (2007)	-.22	2558	PSYC	UA	Uncertainty avoidance	Safety compliance	Safety behavior (physical)	Shipping	Norway
Håvold (2007)	.08	2558	PSYC	UA	Uncertainty avoidance	Safety compliance	Compliance to rules/safety norms/occupational risk behavior	Shipping	Norway
Håvold (2007)	-.28	2558	PSYC	UA	Uncertainty avoidance	Safety compliance	Safety behavior (physical)	Shipping	Norway
Håvold (2007)	-.48	2558	CROSS	MAS	Masculinity	Safety climate	Management and employee commitment	Shipping	Norway
Håvold (2007)	.08	2558	CROSS	MAS	Masculinity	Safety climate	Espouses safety values	Shipping	Norway
Håvold (2007)	-.11	2558	CROSS	MAS	Masculinity	Safety climate	Conflict between safety and work priorities	Shipping	Norway
Håvold (2007)	-.32	2558	CROSS	MAS	Masculinity	Safety climate	Reporting culture	Shipping	Norway
Håvold (2007)	-.16	2558	CROSS	MAS	Masculinity	Safety climate	Officers awareness of risk	Shipping	Norway
Håvold (2007)	-.25	2558	CROSS	MAS	Masculinity	Safety climate	Learning culture	Shipping	Norway
Håvold (2007)	-.08	2558	CROSS	MAS	Masculinity	Safety climate	Safety communication	Shipping	Norway
Håvold (2007)	.03	2558	CROSS	MAS	Masculinity	Safety climate	Perception of safety instructions	Shipping	Norway
Håvold (2007)	.63	10	CROSS	MAS	Masculinity	Safety climate	Adverse safety	Shipping	Norway

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
							conditions at work including fatalism		
Håvold (2007)	-.33	10	CROSS	MAS	Masculinity	Safety climate	Adverse safety conditions at work including fatalism	Shipping	Norway
Håvold (2007)	.13	10	CROSS	MAS	Masculinity	Safety climate	Positive conditions at work	Shipping	Norway
Håvold (2007)	.99	10	NATION	MAS	Masculinity	Safety climate	Positive conditions at work	Shipping	Norway
Håvold (2007)	-.18	10	NATION	MAS	Masculinity	Safety climate	Attitude to safety improvements	Shipping	Norway
Håvold (2007)	.94	10	NATION	MAS	Masculinity	Safety climate	Attitude to safety improvements	Shipping	Norway
Håvold (2007)	.59	2558	NATION	MAS	Masculinity	Safety climate	Management and employee commitment	Shipping	Norway
Håvold (2007)	-.01	2558	NATION	MAS	Masculinity	Safety climate	Espouses safety values	Shipping	Norway
Håvold (2007)	.18	2558	NATION	MAS	Masculinity	Safety climate	Conflict between safety and work priorities	Shipping	Norway
Håvold (2007)	.43	2558	NATION	MAS	Masculinity	Safety climate	Reporting culture	Shipping	Norway
Håvold (2007)	.21	2558	NATION	MAS	Masculinity	Safety climate	Officers awareness of risk	Shipping	Norway
Håvold (2007)	.34	2558	PSYC	MAS	Masculinity	Safety climate	Learning culture	Shipping	Norway
Håvold (2007)	.14	2558	PSYC	MAS	Masculinity	Safety climate	Safety communication	Shipping	Norway
Håvold (2007)	.02	2558	PSYC	MAS	Masculinity	Safety climate	Perception of safety instructions	Shipping	Norway
Håvold (2007)	-.14	2558	PSYC	MAS	Masculinity	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	-.37	10	PSYC	MAS	Masculinity	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	.19	10	PSYC	MAS	Masculinity	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	.22	2558	PSYC	MAS	Masculinity	Safety knowledge	Knowledge/competence	Shipping	Norway

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
Håvold (2007)	.15	2558	PSYC	MAS	Masculinity	Safety compliance	Compliance to rules/safety norms/occupational risk behavior	Shipping	Norway
Håvold (2007)	-.23	2558	PSYC	MAS	Masculinity	Safety compliance	Safety behavior (physical)	Shipping	Norway
Håvold (2007)	-.11	2558	PSYC	MAS	Masculinity	Safety compliance	Compliance to rules/safety norms/occupational risk behavior	Shipping	Norway
Håvold (2007)	.30	2558	PSYC	MAS	Masculinity	Safety compliance	Safety behavior (physical)	Shipping	Norway
Håvold (2007)	.55	2558	NATION	LTO	Long term orientation	Safety climate	Management and employee commitment	Shipping	Norway
Håvold (2007)	-.02	2558	NATION	LTO	Long term orientation	Safety climate	Espouses safety values	Shipping	Norway
Håvold (2007)	.16	2558	NATION	LTO	Long term orientation	Safety climate	Conflict between safety and work priorities	Shipping	Norway
Håvold (2007)	.38	2558	NATION	LTO	Long term orientation	Safety climate	Reporting culture	Shipping	Norway
Håvold (2007)	.19	2558	NATION	LTO	Long term orientation	Safety climate	Officers awareness of risk	Shipping	Norway
Håvold (2007)	.31	2558	NATION	LTO	Long term orientation	Safety climate	Learning culture	Shipping	Norway
Håvold (2007)	.12	2558	NATION	LTO	Long term orientation	Safety climate	Safety communication	Shipping	Norway
Håvold (2007)	.00	2558	NATION	LTO	Long term orientation	Safety climate	Perception of safety instructions	Shipping	Norway
Håvold (2007)	-.39	10	NATION	LTO	Long term orientation	Safety climate	Adverse safety conditions at work including fatalism	Shipping	Norway
Håvold (2007)	.44	10	NATION	LTO	Long term orientation	Safety climate	Adverse safety conditions at work including fatalism	Shipping	Norway

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
Håvold (2007)	.10	10	NATION	LTO	Long term orientation	Safety climate	Positive conditions at work	Shipping	Norway
Håvold (2007)	-.31	10	NATION	LTO	Long term orientation	Safety climate	Positive conditions at work	Shipping	Norway
Håvold (2007)	.26	10	NATION	LTO	Long term orientation	Safety climate	Attitude to safety improvements	Shipping	Norway
Håvold (2007)	-.13	10	NATION	LTO	Long term orientation	Safety climate	Attitude to safety improvements	Shipping	Norway
Håvold (2007)	-.18	2558	NATION	LTO	Long term orientation	Safety climate	Management and employee commitment	Shipping	Norway
Håvold (2007)	.01	2558	NATION	LTO	Long term orientation	Safety climate	Espouses safety values	Shipping	Norway
Håvold (2007)	.01	2558	NATION	LTO	Long term orientation	Safety climate	Conflict between safety and work priorities	Shipping	Norway
Håvold (2007)	-.21	2558	NATION	LTO	Long term orientation	Safety climate	Reporting culture	Shipping	Norway
Håvold (2007)	-.07	2558	NATION	LTO	Long term orientation	Safety climate	Officers awareness of risk	Shipping	Norway
Håvold (2007)	-.09	2558	NATION	LTO	Long term orientation	Safety climate	Learning culture	Shipping	Norway
Håvold (2007)	-.08	2558	NATION	LTO	Long term orientation	Safety climate	Safety communication	Shipping	Norway
Håvold (2007)	-.02	2558	NATION	LTO	Long term orientation	Safety climate	Perception of safety instructions	Shipping	Norway
Håvold (2007)	.21	2558	NATION	LTO	Long term orientation	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	.61	10	NATION	LTO	Long term orientation	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	-.29	10	NATION	LTO	Long term orientation	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	-.09	2558	NATION	LTO	Long term orientation	Safety knowledge	Knowledge/competence	Shipping	Norway
Håvold (2007)	-.12	2558	NATION	LTO	Long term orientation	Safety compliance	Compliance to rules/safety norms/occupational risk	Shipping	Norway

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
							behavior		
Håvold (2007)	.28	2558	NATION	LTO	Long term orientation	Safety compliance	Safety behavior (physical)	Shipping	Norway
Håvold (2007)	-.02	2558	NATION	LTO	Long term orientation	Safety compliance	Compliance to rules/safety norms/occupational risk behavior	Shipping	Norway
Håvold (2007)	-.13	2558	NATION	LTO	Long term orientation	Safety compliance	Safety behavior (physical)	Shipping	Norway
He et al. (2017)	-.46	240	NATION	IDV	Collectivism	Safety climate	Safety climate	Healthcare	China
He et al. (2017)	-.47	240	NATION	IDV	Collectivism	Safety motivation	Safety motivation	Healthcare	China
He et al. (2017)	-.45	240	NATION	IDV	Collectivism	Safety knowledge	Safety knowledge	Healthcare	China
He et al. (2017)	-.61	240	PSYC	IDV	Collectivism	Safety participation	Safety participation	Healthcare	China
He et al. (2017)	-.59	240	PSYC	IDV	Collectivism	Safety compliance	Safety compliance	Healthcare	China
Hetherington (2007)	-.20	1066	NATION	IDV	Individualism-collectivism	Safety compliance	Safety behavior	Oil and gas shipping	Multiple
Hetherington (2007)	-.17	1066	PSYC	PD	Power distance	Safety compliance	Safety behavior	Oil and gas shipping	Multiple
Hetherington (2007)	-.17	1063	PSYC	UA	Uncertainty avoidance	Safety compliance	Safety behavior	Oil and gas shipping	Multiple
Hetherington (2007)	-.08	1065	NATION	MAS	Masculinity	Safety compliance	Safety behavior	Oil and gas shipping	Multiple
Hetherington (2007)	-.15	1062	NATION	LTO	Long term orientation	Safety compliance	Safety behavior	Oil and gas shipping	Multiple
Hsu et al. (2010)	.53	690	PSYC	LTO	Harmonious relationship	Safety climate	Management commitment	Manufacturing	Taiwan
Hsu et al. (2010)	-.34	690	PSYC	LTO	Harmonious relationship	Safety climate	Blame culture	Manufacturing	Taiwan
Hsu et al.	.58	690	PSYC	LTO	Harmonious	Safety climate	Safety supervision	Manufacturing	Taiwan

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
(2010)					relationship				
Hsu et al. (2010)	.37	690	PSYC	LTO	Harmonious relationship	Safety climate	Safety reporting	Manufacturing	Taiwan
Hsu et al. (2010)	.35	690	PSYC	LTO	Harmonious relationship	Safety compliance	Safety practices	Manufacturing	Taiwan
Infortunio (2002)	.00	28	CROSS	IDV	Individualism	Fatal work injuries	Fatal injuries	Construction	Mixed
Infortunio (2002)	.00	23	CROSS	IDV	Individualism	Fatal work injuries	Fatal injuries	Construction	Mixed
Infortunio (2002)	-.02	20	CROSS	IDV	Individualism	Fatal work injuries	Fatal injuries	Construction	Mixed
Infortunio (2002)	-.02	24	CROSS	IDV	Individualism	Fatal work injuries	Fatal injuries	Manufacturing	Mixed
Infortunio (2002)	.00	28	CROSS	IDV	Individualism	Fatal work injuries	Fatal injuries	Manufacturing	Mixed
Infortunio (2002)	-.04	19	CROSS	IDV	Individualism	Fatal work injuries	Fatal injuries	Manufacturing	Mixed
Infortunio (2002)	-.06	16	CROSS	IDV	Individualism	Fatal work injuries	Fatal injuries	Mining	Mixed
Infortunio (2002)	-.04	19	CROSS	IDV	Individualism	Fatal work injuries	Fatal injuries	Mining	Mixed
Infortunio (2002)	-.02	23	CROSS	IDV	Individualism	Fatal work injuries	Fatal injuries	Mining	Mixed
Infortunio (2002)	-.01	19	NATION	IDV	Individualism	Fatal work injuries	Fatal injuries	Mining	Mixed
Infortunio (2002)	-.02	17	NATION	IDV	Individualism	Fatal work injuries	Fatal injuries	Mining	Mixed
Infortunio (2002)	-.06	15	NATION	IDV	Individualism	Fatal work injuries	Fatal injuries	Trade	Mixed
Infortunio (2002)	-.06	21	NATION	IDV	Individualism	Fatal work injuries	Fatal injuries	Transportation	Mixed
Infortunio (2002)	.00	21	PSYC	IDV	Individualism	Fatal work injuries	Fatal injuries	Utilities	Mixed
Infortunio	.00	28	PSYC	PD	Power distance	Fatal work	Fatal injuries	Construction	Mixed

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
(2002)						injuries			
Infortunio (2002)	.00	23	PSYC	PD	Power distance	Fatal work injuries	Fatal injuries	Construction	Mixed
Infortunio (2002)	.01	20	CROSS	PD	Power distance	Fatal work injuries	Fatal injuries	Construction	Mixed
Infortunio (2002)	.02	24	CROSS	PD	Power distance	Fatal work injuries	Fatal injuries	Manufacturing	Mixed
Infortunio (2002)	.03	28	CROSS	PD	Power distance	Fatal work injuries	Fatal injuries	Manufacturing	Mixed
Infortunio (2002)	.05	19	CROSS	PD	Power distance	Fatal work injuries	Fatal injuries	Manufacturing	Mixed
Infortunio (2002)	.04	23	CROSS	PD	Power distance	Fatal work injuries	Fatal injuries	Mining	Mixed
Infortunio (2002)	.01	19	CROSS	PD	Power distance	Fatal work injuries	Fatal injuries	Mining	Mixed
Infortunio (2002)	.01	17	CROSS	PD	Power distance	Fatal work injuries	Fatal injuries	Mining	Mixed
Infortunio (2002)	.00	17	CROSS	PD	Power distance	Fatal work injuries	Fatal injuries	Trade	Mixed
Infortunio (2002)	.08	21	CROSS	PD	Power distance	Fatal work injuries	Fatal injuries	Transportation	Mixed
Infortunio (2002)	.01	21	NATION	PD	Power distance	Fatal work injuries	Fatal injuries	Utilities	Mixed
Infortunio (2002)	.04	15	NATION	UA	Uncertainty avoidance	Fatal work injuries	Fatal injuries	Trade	Mixed
Infortunio (2002)	.01	17	PSYC	UA	Uncertainty avoidance	Fatal work injuries	Fatal injuries	Trade	Mixed
Infortunio (2002)	.03	21	NATION	UA	Uncertainty avoidance	Fatal work injuries	Fatal injuries	Transportation	Mixed
Infortunio (2002)	.09	24	NATION	UA	Uncertainty avoidance	Fatal work injuries	Fatal injuries	Manufacturing	Mixed
Infortunio (2002)	.08	28	NATION	UA	Uncertainty avoidance	Fatal work injuries	Fatal injuries	Manufacturing	Mixed
Infortunio	.07	19	NATION	UA	Uncertainty	Fatal work	Fatal injuries	Manufacturing	Mixed

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
(2002)					avoidance	injuries			
Infortunio (2002)	.10	16	NATION	UA	Uncertainty avoidance	Fatal work injuries	Fatal injuries	Mining	Mixed
Infortunio (2002)	.04	23	NATION	UA	Uncertainty avoidance	Fatal work injuries	Fatal injuries	Mining	Mixed
Infortunio (2002)	.04	19	NATION	UA	Uncertainty avoidance	Fatal work injuries	Fatal injuries	Mining	Mixed
Infortunio (2002)	.03	15	NATION	UA	Uncertainty avoidance	Fatal work injuries	Fatal injuries	Trade	Mixed
Infortunio (2002)	.01	15	NATION	UA	Uncertainty avoidance	Fatal work injuries	Fatal injuries	Trade	Mixed
Infortunio (2002)	.02	17	NATION	UA	Uncertainty avoidance	Fatal work injuries	Fatal injuries	Trade	Mixed
Infortunio (2002)	.01	21	NATION	UA	Uncertainty avoidance	Fatal work injuries	Fatal injuries	Transportation	Mixed
Infortunio (2002)	.08	30	NATION	UA	Uncertainty avoidance	Fatal work injuries	Fatal injuries	Not reported	Mixed
Infortunio (2002)	-.06	14	PSYC	MAS	Masculinity	Fatal work injuries	Fatal injuries	Utilities	Mixed
Infortunio (2002)	-.06	21	PSYC	MAS	Masculinity	Fatal work injuries	Fatal injuries	Utilities	Mixed
Keser et al. (2015)	-.28	60	PSYC	IDV	Individualism	Fatal work injuries	Fatal injuries	Mixed	Mixed
Keser et al. (2015)	.33	60	PSYC	PD	Power distance	Fatal work injuries	Fatal injuries	Mixed	Mixed
Keser et al. (2015)	.05	60	PSYC	UA	Uncertainty avoidance	Fatal work injuries	Fatal injuries	Mixed	Mixed
Keser et al. (2015)	.11	60	PSYC	MAS	Masculinity	Fatal work injuries	Fatal injuries	Mixed	Mixed
Khan (2007)	.13	254	CROSS	IDV	Individualism	Hazard perceptions	Hazard presence	Manufacturing	U.S.
Khan (2007)	-.01	254	CROSS	IDV	Individualism	Safety climate	Supervisor support	Manufacturing	U.S.
Khan (2007)	.08	254	PSYC	IDV	Individualism	Safety climate	Safety assurance	Manufacturing	U.S.
Khan (2007)	-.07	254	PSYC	IDV	Individualism	Safety climate	Hindrances towards	Manufacturing	U.S.

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
							safety		
Khan (2007)	-.09	254	PSYC	IDV	Individualism	Safety behavior	Safety behavior	Manufacturing	U.S.
Khan (2007)	.19	254	PSYC	PD	Power distance	Hazard perceptions	Hazard presence	Manufacturing	U.S.
Khan (2007)	-.08	254	PSYC	PD	Power distance	Safety climate	Supervisor support	Manufacturing	U.S.
Khan (2007)	-.09	254	PSYC	PD	Power distance	Safety climate	Safety assurance	Manufacturing	U.S.
Khan (2007)	-.18	254	PSYC	PD	Power distance	Safety climate	Hindrances towards safety	Manufacturing	U.S.
Khan (2007)	-.04	254	PSYC	PD	Power distance	Safety behavior	Safety behavior	Manufacturing	U.S.
Khan (2007)	.03	254	PSYC	UA	Uncertainty avoidance	Hazard perceptions	Hazard presence	Manufacturing	U.S.
Khan (2007)	.02	254	PSYC	UA	Uncertainty avoidance	Safety climate	Supervisor support	Manufacturing	U.S.
Khan (2007)	-.06	254	PSYC	UA	Uncertainty avoidance	Safety climate	Safety assurance	Manufacturing	U.S.
Khan (2007)	-.03	254	PSYC	UA	Uncertainty avoidance	Safety climate	Hindrances towards safety	Manufacturing	U.S.
Khan (2007)	.03	254	PSYC	UA	Uncertainty avoidance	Safety behavior	Safety behavior	Manufacturing	U.S.
Khan (2007)	-.02	254	CROSS	MAS	Masculinity	Hazard perceptions	Hazard presence	Manufacturing	U.S.
Khan (2007)	-.06	254	CROSS	MAS	Masculinity	Safety climate	Supervisor support	Manufacturing	U.S.
Khan (2007)	-.13	254	PSYC	MAS	Masculinity	Safety climate	Safety assurance	Manufacturing	U.S.
Khan (2007)	-.06	254	PSYC	MAS	Masculinity	Safety climate	Hindrances towards safety	Manufacturing	U.S.
Khan (2007)	-.23	254	PSYC	MAS	Masculinity	Safety behavior	Safety behavior	Manufacturing	U.S.
Khan (2007)	.03	254	PSYC	LTO	Long-term orientation	Hazard perceptions	Hazard presence	Manufacturing	U.S.
Khan (2007)	.02	254	PSYC	LTO	Long-term orientation	Safety climate	Supervisor support	Manufacturing	U.S.

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
Khan (2007)	.01	254	PSYC	LTO	Long-term orientation	Safety climate	Safety assurance	Manufacturing	U.S.
Khan (2007)	-.03	254	PSYC	LTO	Long-term orientation	Safety climate	Hindrances towards safety	Manufacturing	U.S.
Khan (2007)	-.04	254	PSYC	LTO	Long-term orientation	Safety behavior	Safety behavior	Manufacturing	U.S.
Kortmann (2015)	.25	196	PSYC	UA	Uncertainty avoidance	Safety knowledge	Safety consciousness	Mixed	Netherlands
Lu et al. (2016)	-.58	322	PSYC	IDV	Collectivism	Safety behavior	Safety behavior	Shipping	Taiwan
Lu et al. (2016)	.31	322	PSYC	PD	Power distance	Safety behavior	Safety behavior	Shipping	Taiwan
Lu et al. (2016)	.52	322	NATION	UA	Uncertainty avoidance	Safety behavior	Safety behavior	Shipping	Taiwan
Lu et al. (2016)	-.21	322	PSYC	MAS	Masculinity	Safety behavior	Safety behavior	Shipping	Taiwan
Lu et al. (2016)	.58	322	PSYC	LTO	Long-term orientation	Safety behavior	Safety behavior	Shipping	Taiwan
Mearns & Yule (2017)	.00	822	PSYC	IDV	Individualism	Safety climate	Management commitment	Construction	Mixed
Mearns & Yule (2017)	.01	833	PSYC	IDV	Individualism	Safety compliance	Safety compliance	Construction	Mixed
Mearns & Yule (2017)	-.19	822	NATION	PD	Power distance	Safety climate	Management commitment	Construction	Mixed
Mearns & Yule (2017)	-.09	831	NATION	PD	Power distance	Safety compliance	Safety compliance	Construction	Mixed
Mearns & Yule (2017)	-.06	822	PSYC	MAS	Masculinity	Safety climate	Management commitment	Construction	Mixed
Mearns & Yule (2017)	-.09	824	PSYC	MAS	Masculinity	Safety compliance	Safety compliance	Construction	Mixed
Minkov (2016)	.38	48	PSYC	IDV	Collectivism	Safety behavior	National airline safety rating	Aviation	Mixed
Minkov (2016)	-.66	56	PSYC	IDV	Collectivism	Fatal work injuries	Occupational fatality rate	Mixed	Mixed

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
Mohamed et al. (2009)	.59	140	PSYC	PD	Power distance	Safety climate	Physical work environment	Construction	Pakistan
Mohamed et al. (2009)	-.61	140	PSYC	PD	Power distance	Safety climate	Awareness and beliefs	Construction	Pakistan
Mohamed et al. (2009)	.56	140	PSYC	PD	Power distance	Safety climate	Supportive environment	Construction	Pakistan
Mohamed et al. (2009)	.78	140	PSYC	UA	Uncertainty avoidance	Safety climate	Physical work environment	Construction	Pakistan
Mohamed et al. (2009)	.80	140	PSYC	UA	Uncertainty avoidance	Safety climate	Awareness and beliefs	Construction	Pakistan
Mohamed et al. (2009)	.52	140	PSYC	UA	Uncertainty avoidance	Safety climate	Supportive environment	Construction	Pakistan
Nielson et al. (2015)	.08	2077	CROSS	MAS	Gender orientation	Safety climate	Safety involvement	Mixed	Denmark
Nielson et al. (2015)	-.01	2077	CROSS	MAS	Masculinity ideals	Safety climate	Safety involvement	Mixed	Denmark
Nielson et al. (2015)	.02	2077	CROSS	MAS	Gender orientation	Safety climate	Commitment of the safety representative	Mixed	Denmark
Nielson et al. (2015)	-.04	2077	CROSS	MAS	Masculinity ideals	Safety climate	Commitment of the safety representative	Mixed	Denmark
Nielson et al. (2015)	.03	2077	CROSS	MAS	Gender orientation	Safety-specific leadership	Safety leadership	Mixed	Denmark
Nielson et al. (2015)	.04	2077	CROSS	MAS	Masculinity ideals	Safety-specific leadership	Safety leadership	Mixed	Denmark
Nielson et al. (2015)	.09	2077	CROSS	MAS	Gender orientation	Safety participation	Safety oversights	Mixed	Denmark
Nielson et al. (2015)	-.13	2077	CROSS	MAS	Gender orientation	Safety participation	Safety oversights	Mixed	Denmark
Nielson et al. (2015)	-.19	2077	CROSS	MAS	Masculinity ideals	Safety participation	Safety oversights	Mixed	Denmark
Nielson et al. (2015)	.00	2077	CROSS	MAS	Gender orientation	Safety compliance	Safety priority	Mixed	Denmark
Nielson et al. (2015)	-.04	2077	NATION	MAS	Gender orientation	Safety compliance	Safety priority	Mixed	Denmark

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
Nielson et al. (2015)	-.04	2077	NATION	MAS	Masculinity ideals	Safety compliance	Safety priority	Mixed	Denmark
Nielson et al. (2015)	-.01	2077	NATION	MAS	Gender orientation	Safety compliance	Safety violations	Mixed	Denmark
Nielson et al. (2015)	-.02	2077	NATION	MAS	Gender orientation	Safety compliance	Safety violations	Mixed	Denmark
Nielson et al. (2015)	-.10	2077	NATION	MAS	Masculinity ideals	Safety compliance	Safety violations	Mixed	Denmark
Noort et al. (2015)	-.16	13616	PSYC	UA	Uncertainty avoidance	Safety climate	Management commitment	Aviation	Europe
Noort et al. (2015)	-.23	13616	PSYC	UA	Uncertainty avoidance	Safety climate	Collaborating for safety	Aviation	Europe
Noort et al. (2015)	-.23	13616	PSYC	UA	Uncertainty avoidance	Safety climate	Incident reporting	Aviation	Europe
Noort et al. (2015)	-.18	13616	PSYC	UA	Uncertainty avoidance	Safety climate	Communication	Aviation	Europe
Noort et al. (2015)	-.13	13616	PSYC	UA	Uncertainty avoidance	Safety climate	Colleague commitment to safety	Aviation	Europe
Noort et al. (2015)	-.17	13616	PSYC	UA	Uncertainty avoidance	Safety climate	Safety support	Aviation	Europe
Okolie & Okoye (2012)	-.88	120	NATION	IDV	Collectivism	Safety climate	Safety climate	Construction	Nigeria
Okolie & Okoye (2012)	-.95	60	PSYC	IDV	Collectivism	Safety climate	Safety climate	Construction	Nigeria
Okolie & Okoye (2012)	.93	120	PSYC	PD	Power distance	Safety climate	Safety climate	Construction	Nigeria
Okolie & Okoye (2012)	.91	60	PSYC	PD	Power distance	Safety climate	Safety climate	Construction	Nigeria
Okolie & Okoye (2012)	.75	120	CROSS	UA	Uncertainty avoidance	Safety climate	Safety climate	Construction	Nigeria
Okolie & Okoye (2012)	.90	60	CROSS	UA	Uncertainty avoidance	Safety climate	Safety climate	Construction	Nigeria
Okolie & Okoye (2012)	-.95	120	NATION	MAS	Femininity	Safety climate	Safety climate	Construction	Nigeria

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
Okolie & Okoye (2012)	-.99	60	NATION	MAS	Femininity	Safety climate	Safety climate	Construction	Nigeria
Okolie & Okoye (2012)	.47	120	PSYC	LTO	Long term orientation	Safety climate	Safety climate	Construction	Nigeria
Okolie & Okoye (2012)	.65	60	PSYC	LTO	Long term orientation	Safety climate	Safety climate	Construction	Nigeria
Ozkan & Lajunen (2007)	-.66	34	NATION	IDV	Individualism	Fatal work injuries	Fatalities	Mixed	Mixed
Ozkan & Lajunen (2007)	.46	34	PSYC	PD	Power distance	Fatal work injuries	Fatalities	Mixed	Mixed
Ozkan & Lajunen (2007)	.32	34	CROSS	UA	Uncertainty avoidance	Fatal work injuries	Fatalities	Mixed	Mixed
Ozkan & Lajunen (2007)	.17	34	NATION	MAS	Masculinity	Fatal work injuries	Fatalities	Mixed	Mixed
Ozkan & Lajunen (2007)	.28	26	PSYC	LTO	Long-short orientation	Fatal work injuries	Fatalities	Mixed	Mixed
Park (2011)	-.05	39	NATION	IDV	Institutional individualism-collectivism	Man-made disasters	Man-made disasters	Mixed	Mixed
Park (2011)	.27	39	CROSS	UA	Uncertainty avoidance	Man-made disasters	Man-made disasters	Mixed	Mixed
Park (2011)	.14	39	PSYC	MAS	Gender egalitarianism	Man-made disasters	Man-made disasters	Mixed	Mixed
Power et al. (2015)	-.05	1453	CROSS	IDV	Institutional collectivism	Safety climate	Competitive goal of environment/safety	Manufacturing	Mixed
Power et al. (2015)	-.06	1453	NATION	IDV	In-group collectivism	Safety climate	Competitive goal of environment/safety	Manufacturing	Mixed
Power et al. (2015)	-.09	1453	NATION	IDV	Institutional collectivism	Safety behavior	Environment and safety practice	Manufacturing	Mixed
Power et al. (2015)	-.14	1453	NATION	IDV	In-group collectivism	Safety behavior	Environment and safety practice	Manufacturing	Mixed
Power et al. (2015)	-.05	1453	PSYC	PD	Power distance	Safety climate	Competitive goal of environment/safety	Manufacturing	Mixed
Power et al. (2015)	.01	1453	PSYC	PD	Power distance	Safety behavior	Environment and safety practice	Manufacturing	Mixed

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
Power et al. (2015)	-.01	1453	CROSS	UA	Uncertainty avoidance	Safety climate	Competitive goal of environment/safety	Manufacturing	Mixed
Power et al. (2015)	-.09	1453	CROSS	UA	Uncertainty avoidance	Safety behavior	Environment and safety practice	Manufacturing	Mixed
Power et al. (2015)	-.09	1453	NATION	MAS	Humane orientation	Safety climate	Competitive goal of environment/safety	Manufacturing	Mixed
Power et al. (2015)	-.11	1453	NATION	MAS	Humane orientation	Safety behavior	Environment and safety practice	Manufacturing	Mixed
Power et al. (2015)	.03	1453	PSYC	LTO	Future orientation	Safety climate	Competitive goal of environment/safety	Manufacturing	Mixed
Power et al. (2015)	-.05	1453	PSYC	LTO	Future orientation	Safety behavior	Environment and safety practice	Manufacturing	Mixed
Reader et al. (2015)	.13	6407	CROSS	IDV	Collectivism	Safety climate	Management commitment	Aviation	Europe
Reader et al. (2015)	.19	6407	CROSS	IDV	Collectivism	Safety climate	Collaborating for safety	Aviation	Europe
Reader et al. (2015)	.19	6407	CROSS	IDV	Collectivism	Safety climate	Incident reporting	Aviation	Europe
Reader et al. (2015)	.16	6407	CROSS	IDV	Collectivism	Safety climate	Communication	Aviation	Europe
Reader et al. (2015)	.13	6407	CROSS	IDV	Collectivism	Safety climate	Colleague commitment	Aviation	Europe
Reader et al. (2015)	.20	6407	CROSS	IDV	Collectivism	Safety climate	Safety support	Aviation	Europe
Reader et al. (2015)	-.16	6407	PSYC	PD	Power distance	Safety climate	Management commitment	Aviation	Europe
Reader et al. (2015)	-.17	6407	PSYC	PD	Power distance	Safety climate	Collaborating for safety	Aviation	Europe
Reader et al. (2015)	-.28	6407	PSYC	PD	Power distance	Safety climate	Incident reporting	Aviation	Europe
Reader et al. (2015)	-.21	6407	PSYC	PD	Power distance	Safety climate	Communication	Aviation	Europe
Reader et al. (2015)	-.20	6407	PSYC	PD	Power distance	Safety climate	Colleague commitment	Aviation	Europe

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
Reader et al. (2015)	-.26	6407	PSYC	PD	Power distance	Safety climate	Safety support	Aviation	Europe
Reader et al. (2015)	-.30	6407	CROSS	UA	Uncertainty avoidance	Safety climate	Management commitment	Aviation	Europe
Reader et al. (2015)	-.33	6407	CROSS	UA	Uncertainty avoidance	Safety climate	Collaborating for safety	Aviation	Europe
Reader et al. (2015)	-.40	6407	CROSS	UA	Uncertainty avoidance	Safety climate	Incident reporting	Aviation	Europe
Reader et al. (2015)	-.35	6407	CROSS	UA	Uncertainty avoidance	Safety climate	Communication	Aviation	Europe
Reader et al. (2015)	-.27	6407	CROSS	UA	Uncertainty avoidance	Safety climate	Colleague commitment	Aviation	Europe
Reader et al. (2015)	-.38	6407	CROSS	UA	Uncertainty avoidance	Safety climate	Safety support	Aviation	Europe
Reader et al. (2015)	-.10	6407	CROSS	MAS	Masculinity	Safety climate	Management commitment	Aviation	Europe
Reader et al. (2015)	-.23	6407	CROSS	MAS	Masculinity	Safety climate	Collaborating for safety	Aviation	Europe
Reader et al. (2015)	-.28	6407	CROSS	MAS	Masculinity	Safety climate	Incident reporting	Aviation	Europe
Reader et al. (2015)	-.16	6407	CROSS	MAS	Masculinity	Safety climate	Communication	Aviation	Europe
Reader et al. (2015)	-.14	6407	CROSS	MAS	Masculinity	Safety climate	Colleague commitment	Aviation	Europe
Reader et al. (2015)	-.14	6407	NATION	MAS	Masculinity	Safety climate	Safety support	Aviation	Europe
Reader et al. (2015)	.36	6407	PSYC	LTO	Short term orientation	Safety climate	Management commitment	Aviation	Europe
Reader et al. (2015)	.38	6407	PSYC	LTO	Short term orientation	Safety climate	Collaborating for safety	Aviation	Europe
Reader et al. (2015)	.34	6407	PSYC	LTO	Short term orientation	Safety climate	Incident reporting	Aviation	Europe
Reader et al. (2015)	.33	6407	PSYC	LTO	Short term orientation	Safety climate	Communication	Aviation	Europe

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
Reader et al. (2015)	.13	6407	PSYC	LTO	Short term orientation	Safety climate	Colleague commitment	Aviation	Europe
Reader et al. (2015)	.36	6407	PSYC	LTO	Short term orientation	Safety climate	Safety support	Aviation	Europe
Reniers & Gidron (2013)	-.60	22	CROSS	IDV	Individualism	Fatal work injuries	Fatalities	Mixed	Europe
Reniers & Gidron (2013)	.61	22	CROSS	PD	Power distance	Fatal work injuries	Fatalities	Mixed	Europe
Reniers & Gidron (2013)	.42	22	CROSS	UA	Uncertainty avoidance	Fatal work injuries	Fatalities	Mixed	Europe
Reniers & Gidron (2013)	.27	22	PSYC	MAS	Masculinity	Fatal work injuries	Fatalities	Mixed	Europe
Shen (2013)	.06	292	CROSS	IDV	Individualism	Safety climate	Total safety commitment and employee involvement	Construction	China
Shen (2013)	-.20	292	CROSS	IDV	Individualism	Safety climate	Bad practices	Construction	China
Shen (2013)	.17	292	CROSS	IDV	Individualism	Safety climate	Supervisor practice	Construction	China
Shen (2013)	.04	292	NATION	IDV	Individualism	Safety motivation	Internal motivators	Construction	China
Shen (2013)	.21	292	NATION	IDV	Individualism	Safety motivation	External motivators	Construction	China
Shen (2013)	.01	292	PSYC	IDV	Individualism	Safety knowledge	Safety knowledge	Construction	China
Shen (2013)	.12	292	PSYC	IDV	Individualism	Safety participation	Safety participation	Construction	China
Shen (2013)	.03	292	PSYC	IDV	Individualism	Safety compliance	Safety compliance	Construction	China
Shen et al. (2015)	.15	292	PSYC	IDV	Individualism	Safety-specific leadership	Safety-specific leader-member exchange	Construction	China
Soeters & Boer (2000)	-.55	14	PSYC	IDV	Individualism	Accident rates	Accident ratios	Aviation	Mixed
Soeters & Boer (2000)	-.84	11	PSYC	IDV	Individualism	Accident rates	Accident ratios	Aviation	Mixed
Soeters & Boer	.48	14	CROSS	PD	Power distance	Accident rates	Accident ratios	Aviation	Mixed

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
(2000)									
Soeters & Boer (2000)	.55	11	CROSS	PD	Power distance	Accident rates	Accident ratios	Aviation	Mixed
Soeters & Boer (2000)	.54	14	CROSS	UA	Uncertainty avoidance	Accident rates	Accident ratios	Aviation	Mixed
Soeters & Boer (2000)	.66	11	CROSS	UA	Uncertainty avoidance	Accident rates	Accident ratios	Aviation	Mixed
Soeters & Boer (2000)	-.07	14	PSYC	MAS	Masculinity	Accident rates	Accident ratios	Aviation	Mixed
Soeters & Boer (2000)	-.14	11	PSYC	MAS	Masculinity	Accident rates	Accident ratios	Aviation	Mixed
Tear et al. (2016)	-.05	13573	PSYC	PD	Power distance	Safety climate	Safety culture	Aviation	Europe
Tharaldsen et al. (2010)	-.36	603	CROSS	PD	Questioning boss	Safety climate	Trust in colleagues commitment	Oil drilling	Norway
Tharaldsen et al. (2010)	-.25	604	CROSS	PD	Social distance	Safety climate	Trust in colleagues commitment	Oil drilling	Norway
Tharaldsen et al. (2010)	-.31	603	CROSS	PD	Questioning boss	Safety climate	Trust in supervisor commitment	Oil drilling	Norway
Tharaldsen et al. (2010)	-.30	604	CROSS	PD	Social distance	Safety climate	Trust in supervisor commitment	Oil drilling	Norway
Tharaldsen et al. (2010)	-.21	169	CROSS	PD	Questioning boss	Safety climate	Trust in colleagues commitment	Oil drilling	United Kingdom
Tharaldsen et al. (2010)	-.04	165	CROSS	PD	Social distance	Safety climate	Trust in colleagues commitment	Oil drilling	United Kingdom
Tharaldsen et al. (2010)	-.32	169	CROSS	PD	Questioning boss	Safety climate	Trust in supervisor commitment	Oil drilling	United Kingdom
Tharaldsen et al. (2010)	-.02	165	CROSS	PD	Social distance	Safety climate	Trust in supervisor commitment	Oil drilling	United Kingdom
Tharaldsen et al. (2010)	-.24	616	CROSS	PD	Questioning boss	Safety participation	Safety participation	Oil drilling	Norway
Tharaldsen et al. (2010)	-.20	611	CROSS	PD	Social distance	Safety participation	Safety participation	Oil drilling	Norway
Tharaldsen et	-.28	169	CROSS	PD	Questioning	Safety	Safety participation	Oil drilling	United

Article	*r*	*N*	Level[a]	Cultural Value[b]	IV Study Label	Safety Construct	DV Study Label	Industry	Org Country
al. (2010)					boss	participation			Kingdom
Tharaldsen et al. (2010)	-.21	165	NATION	PD	Social distance	Safety participation	Safety participation	Oil drilling	United Kingdom
Tharaldsen et al. (2010)	-.19	616	NATION	PD	Questioning boss	Safety compliance	Safety compliance	Oil drilling	Norway
Tharaldsen et al. (2010)	-.13	611	PSYC	PD	Social distance	Safety compliance	Safety compliance	Oil drilling	Norway
Tharaldsen et al. (2010)	-.16	169	PSYC	PD	Questioning boss	Safety compliance	Safety compliance	Oil drilling	United Kingdom
Tharaldsen et al. (2010)	-.05	165	PSYC	PD	Social distance	Safety compliance	Safety compliance	Oil drilling	United Kingdom
Tharaldsen et al. (2010)	-.31	603	PSYC	MAS	Assertiveness	Safety climate	Trust in colleagues commitment	Oil drilling	Norway
Tharaldsen et al. (2010)	-.29	604	PSYC	MAS	Assertiveness	Safety climate	Trust in supervisor commitment	Oil drilling	Norway
Tharaldsen et al. (2010)	-.11	169	PSYC	MAS	Assertiveness	Safety climate	Trust in colleagues commitment	Oil drilling	United Kingdom
Tharaldsen et al. (2010)	-.17	165	PSYC	MAS	Assertiveness	Safety climate	Trust in supervisor commitment	Oil drilling	United Kingdom
Tharaldsen et al. (2010)	-.17	618	PSYC	MAS	Assertiveness	Safety participation	Safety participation	Oil drilling	Norway
Tharaldsen et al. (2010)	-.05	169	PSYC	MAS	Assertiveness	Safety participation	Safety participation	Oil drilling	United Kingdom
Tharaldsen et al. (2010)	-.14	618	PSYC	MAS	Assertiveness	Safety compliance	Safety compliance	Oil drilling	Norway
Tharaldsen et al. (2010)	.10	169	PSYC	MAS	Assertiveness	Safety compliance	Safety compliance	Oil drilling	United Kingdom

Note. [a] PSYC = psychological level of analysis, CROSS = cross level of analysis, NATION = national level of analysis; [b] IDV = individualism, PD = power distance, UA = uncertainty avoidance, MAS = masculinity, LTO = long-term orientation.